Exposure Survey Autumn 1988: A Study of the Amount and Type of Driving Done by Ontario Drivers

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ABSTRACT

A STUDY OF THE AMOUNT AND TYPE OF DRIVING DONE BY ONTARIO DRIVERS

To obtain information on driving exposure in the province of Ontario, a mail survey of 12,019 drivers, stratified by age, sex and region of the province, was carried out in the fall of 1988. Among drivers aged 16-24, 50% were sent one-day trip logs and 50% three-day trip logs. Drivers aged 25-59 all received a one-day log; in this age group, 504 received a road map as an incentive. A second subsample of 504 were given the option of responding by telephone if they preferred. Drivers over 60 all received a three-day log. Reminders were sent to all drivers 3 weeks after the initial mailing. Drivers failing to respond six weeks after the initial mailing were sent a short questionnaire to probe non-response.

The return rate of completed questionnaires among eligible drivers was 36.0%. Comparison by targeting strategy (map, telephone option and log-length) showed that while shorter diaries have a small increase in return rate, it is not enough to offset the decrease in precision of the estimates. Response rates either did not vary with incentives (phone) or had different effects on male and female drivers (map).

Results of the survey include data for the various age, sex and regional groups on age of obtaining license, method of learning to drive, employment status, employment as a driver, and global 12 month and 7 day estimates of driving distance. Trip diary results showed that mean distances per day ranged from 8 - 77 km depending on the group. Women reported driving approximately half the distance of men in their age group, older drivers reported driving between half and two-thirds the distance driven by drivers in the 25-59 year old group. Drivers in southern rural areas reported driving more than those in other regions. Men spent longer in the car each day than women, however differences for time spent were not as pronounced as for distance driven, indicating that women drove at slower speeds (probably because of road type) than men. Data on accident rates per million

kilometres by sex and age were calculated using approximately 800,000 Ontario driver records and the data gathered in this study.

Accident rates per million km. for males decline from a high of 7.58 for 16 - 19 year olds to a low of 2.64 for 60 - 69 year olds, after which they begin to rise again. For females the rates are lower than those for men in the equivalent age group except for women drivers over 70.

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Résumé

Sondage sur les habitudes de conduite des Ontariens et le temps qu'ils passent au volant

À l'automne de 1988, pour obtenir des renseignements sur leurs habitudes de conduite, un sondage a été envoyé par la poste à 12 019 conducteurs et conductrices de divers groupes d'âge provenant de différentes régions de l'Ontario. La moitié des conducteurs et conductrices âgés de 16 à 24 ans a reçu un carnet de route d'une journée et l'autre moitié a reçu un carnet de route de trois jours. Les conducteurs et conductrices âgés de 25 à 59 ans ont reçu un carnet de route d'une journée et, dans ce groupe, 504 personnes ont reçu en plus une carte routière à titre de mesure incitative. De plus, un autre sous-échantillon de 504 personnes a eu la possibilité de répondre par téléphone s'il le désirait. Les conducteurs et conductrices âgés de plus de 60 ans ont reçu un carnet de route de trois jours. On a envoyé une lettre de rappel à tous les conducteurs et conductrices trois semaines après leur avoir envoyé le sondage. Six semaines après l'envoi initial, on a addressé aux personnes n'ayant pas répondu au sondage un bref questionnaire visant à identifier les raisons pour lesquelles elles n'y avaient pas répondu.

Le taux de retour des questionnaires dûment remplis par les personnes admissibles a été de 36 pour 100. Une étude comparative des stratégies de ciblage (carte, possibilité de répondre par téléphone et durée des carnets) a révélé que davantage de personnes ayant reçu un carnet d'une journée avaient répondu au sondage, mais que cette différence ne suffisait pas à compenser l'imprécision des estimations fournies. On a constaté que les mesures incitatives n'influençaient pas le taux de réponse (possibilité de répondre par téléphone) ou qu'elles avaient des effets différents sur les conducteurs et les conductrices (carte routière).

Le sondage a permis de recueillir des données sur l'âge et le sexe des conducteurs, les variations régionales de l'âge auquel les répondants ont obtenu leur permis de conduire, la méthode d'apprentissage de la conduite automobile, leur situation professionnelle et le nombre de personnes qui conduisent un véhicule dans le cadre de leur emploi, de même qu'une estimation de la distance globale parcourue par semaine et par année. Les carnets de route ont révélé que la distance moyenne quotidienne parcourue variait de 8 à 77 km selon le groupe de répondants. La distance parcourue par les femmes était d'environ la moitié de celle parcourue par les hommes du même groupe d'âge. Les personnes plus âgées parcourent entre la moitié et les deux-tiers de la distance parcourue par les personnes âgées de 25 à 59 ans. Les

conducteurs et conductrices dans les régions rurales du sud ontarien ont indiqués qu'ils conduisent plus que leur semblables dans les autres régions. Les hommes passent plus de temps au volant que les femmes, mais la différence entre les deux sexes etait plus marquée pour la distance parcourue. Cela démontre que les femmes conduisent plus lentement que les hommes (probablement a cause des routes typiquement choisies par les conductrices). Nous nous sommes servis des fiches de 800,000 conducteurs et conductrices ontariens et des données obtenues par ce sondage pour calculer le taux de collision par million de kilometres par sexe et groupe d'âge. Le taux de collision pour les hommes diminue d'une maximum de 7,58 pour ceux âgés entre 16 et 19 ans jusqu'a une minimum de 2,64 pour ceux entre 60 et 69 ans. Le taux continue d'augmenter pour les conducteurs qui dépassent 70 ans. Le taux des femmes etait plus bas pour touts les groupes d'âges, a l'exception des conductrices ayant plus de 70 ans.

EXECUTIVE SUMMARY

To obtain detailed information on driving exposure in the province of Ontario, a survey of 12,019 drivers, stratified by age, sex and region of the province, was carried out in the fall of 1988, using a mailed triplog. The survey instrument was based on that used in Quebec in 1985-6. Among drivers aged 16-24, 50% were sent one-day trip logs and 50% three-day trip logs. Drivers aged 25-59 all received a one-day log; in this age group, 504 received a road map as an incentive gift. A second subsample of 504 were given the option of responding by telephone if they preferred. Drivers over 60 all received a three-day log. Reminders were sent to all drivers 3 weeks after the initial mailing. Drivers failing to respond six weeks after the initial mailing were sent a short questionnaire to probe non-response.

After excluding drivers who had died, moved or reported no longer driving, 10,164 eligible drivers remained. The return rate of completed questionnaires among these drivers was 36.0%. Comparison by targeting strategy (map, telephone option and log-length) provided evidence that shorter diaries have a small increase in return rate, but this is not enough to compensate for the decrease in precision of the estimates based on shorter times for data collection of the data. Response rates either did not vary with incentives (phone) or had different effects on male and female drivers (map). Female drivers were more likely to respond, and male drivers, less likely to respond when a map was included than when it was not.

The main results of the questionnaire survey are as follows. The median age at which respondents in each cell obtained their driving license varied by age, sex and region. Being young, male and living in southern rural areas was associated with obtaining a license at an earlier age. Differences between males and females, and between regions of the province became more pronounced with age.

The most frequent method of learning to drive overall was with parents and family for those 25-79 years old, and for females over 80. For younger drivers, driver education was the most frequent method of learning, while

for male drivers 60 and over, especially those in the north, being self-taught was the most frequent method. For all age groups and regions, males were much more likely to report being self-taught than females, while females were much more likely to report having taken driver education than males. The differences between males and females become much more pronounced with increasing age. For almost all age and sex groups, urban drivers were more likely to report having taken driver education than non-urban drivers.

The respondents most frequently reporting employment as a driver were males under the age of 59, with the largest number, 16.2%, being 20-24 year olds living in the north. Trip diary results showed that, overall, women reported driving approximately half the distance of men in their age group, older drivers reported driving between half and two-thirds the distance driven by drivers in the 25-59 year old group. Drivers in southern rural areas reported driving more than those in other regions. Women and older drivers made fewest numbers of trips, while male drivers in the 20-24 year old group in the southern urban regions made most. Approximately 50% of male drivers in the 20-24 year old group reported 3 or more trips per day, while for drivers in the 70-79 year old group the equivalent figure was, on average, 12%. As would be expected from reported distance driven, men spent longer in the car each day than women, however differences for time spent were not as pronounced as for distance driven, indicating that women drove at slower speeds (probably because of relatively less highway driving) than men. The mean total time per day spent in the car ranged from a high of 77 minutes for southern rural men in the 20-24 year old group to a low of 8 minutes for 80 + southern rural females. The relationship between reported distance, age, gender, and region held for global 12 month and 7 day estimates from the questionnaire as well as for trip log estimates.

Data on accident rates for each age and sex group were obtained using a set of 800,000 Ontario driver records. These data were then combined with the data gathered in this study to give accident rates per million km..

Rates for males decline from a high of 7.58 per person per million km. for the 16 - 19 year old group to a low of 2.64 per person per million km. for the 60 - 69 year old group, after which they begin to rise again but do not reach the level of 16 - 19 year old males even in the 80+ group.

For females the rates are lower than those for men in comparable age groups, except for women drivers over 70. For women drivers the rates of the 80+ group exceed those of 16 - 19 year old women.

For both males and females in the 80+ group, the 95% confidence intervals for accident rates per km. are very wide, meaning these estimates are not very reliable, and must be treated with caution.

Data from this study provide possible explanations for the higher accident rate per million km. for older women (here, over 60 years of age) as compared to older men. These data show relatively less highway driving for women, and therefore greater exposure to conflict situations, and less driving experience, in the sense of fewer kilometres driven as well as in the sense of less time holding a license. However, the factors which result in women under 60 having a lower accident rate than men are clearly strong enough to offset the differences described above. Possible explanations for the higher accident rate for under-60 men as compared with under-60 women, is that men do relatively more night driving, relatively more rush hour driving and have a different driving style.

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1.0 INTRODUCTION

Information on exposure is vital to assess traffic safety programmes, to compare target groups within programmes and to compare programmes in groups with different exposures. Unfortunately, exposure data is frequently lacking; no standard method or model for data collection exists in this area. The postal questionnaire, sometimes supplemented with telephone interviews or other more personal contact, is one of very few methods available for collection of detailed exposure information from the general driving population. While there is much good advice of a general nature available (Woodward, 1982), evaluation of specific strategies and situations arising in mailed questionnaires is required (Warwick & Lininger, 1975). Concern is often expressed over both the quantity and quality of response in postal questionnaires (Warwick & Lininger, 1975, Kelsey, 1986): return rates are often lower for mailed questionnaires than for personal or telephone interviews, and the information obtained can rarely address questions of any complexity. However, when information is to be collected over a specific time interval, as in a diary, mailed questionnaires have a distinct advantage over other forms of data collection. Telephone or personal interviews depend on accurate recall in place of a recording of events, such as episodes of driving, as they occur.

The Ministry of Transportation in Ontario (MTO) sponsored this survey to investigate levels of exposure among drivers at the two extremes of age and a control group of other adult drivers within urban, rural and northern regions in the province. However, the study was also to serve as a prototype for subsequent surveys of other specific subgroups of drivers. Therefore, the study allowed us to investigate certain strategies proposed for surveys of driving exposure. Following a brief description of the general strategy of the survey, we will outline the specific methodological studies.

2.0 METHODS

2.1 General Sampling Strategy

A stratified random sample was selected from the registry of licensed drivers in the province of Ontario in September 1988. Three stratifying variables, age, sex and region, were used in a factorial design. MTO was particularly interested in collecting exposure data for young and elderly drivers. So as to obtain suitable samples from these drivers, two groups of young drivers (16-19 and 20-24 years) and three groups of older drivers (60-69, 70-79 and 80+) were defined, with the age group 25-59 used for comparison. From the age of 70, drivers in Ontario come under increased surveillance if involved in an "at fault" accident, and from age 80, must pass annual driving examinations.

Within each age group, six further strata were defined by gender and place of residence: northern Ontario, and rural communities or urban centres in southern Ontario. Since the urban areas of northern Ontario are small and there are no divided highways, the accident rates for northern residents in rural and urban areas are expected to be fairly uniform. Therefore, it was not deemed necessary to further divide the category "North" into "rural" and "urban" subcategories for sampling purposes. Characteristics of the postal code were used to determine membership in each of the three regional strata. According to Canada Post, a postal code beginning with the letter "P" indicates a Northern Ontario destination. Postal codes beginning with "K", "L", "M", or "N" refer to Southern (and Central) Ontario destinations. Rural locations are defined by the presence of a zero in the second position of the first triad and in the last position of the code. This designates both rural route and general delivery to smaller centres. Exceptions to this rule include those rural route and general deliveries that are associated with urban centres (e.g. Barrie, Kitchener, etc.). These destinations are classified as urban by Canada Post and as such do not have a zero in the postal code. To check for the frequency of such occurrences in sampling, a question was included in the questionnaire which asked the respondent to classify

home location (e.g. rural/urban). The extent of agreement between the postal code assignment and the respondents could then be determined.

Altogether 36 strata were defined and samples of 330-335 drawn from each. This resulted in approximately equal sample sizes for each combination of age group, gender and region of residence. The definitions of strata reflected specific study interests in drivers at the extremes of age, or who live (and drive) in different environments. Groups of interest were not so common in the overall driving population that a simple random sample would likely include enough drivers from these groups to be useful for analysis. This was the rationale for using a stratified sampling plan.

2.1.1 Calculation of Target Cell Sizes

The actual target cell sizes for the various combinations of age group, sex, and region were calculated based on detailed variance tables kindly offered by the Regie de l'assurance automobile du Quebec (RAAQ). From the Quebec results, values for the mean and standard deviation of the distance driven per day were derived for each sex and three broad age groups: 16-24, 25-64 and 65+. These were used to calculate the anticipated width of the 95% confidence interval for the mean daily distance driven if responses were received from 100, 125 or 200 drivers in each stratum. These widths were expressed as X kilometres and as a percentage of the expected mean value ($\pm$ X%). Assuming 100 responses per cell, the means and their 95% confidence intervals are:

	Daily Kilometres Driven	
	Male	Female
Young (16-24)	33$\pm$10	18$\pm$6
Middle (25-64)	47$\pm$14	21$\pm$9
Elderly (65+)	25$\pm$ 7	15$\pm$4

Our target response rate was 100 drivers per cell. With 100 drivers per cell in the sample, the 95% confidence bounds are either less than 30% of the mean or less than 10 kilometres, or both. Thus our survey was designed to produce approximately the same precision of estimates as was obtained in the Quebec survey. (Doubling the sample sizes would have increased the precision of the estimate by reducing the width of the confidence interval to about 70% of the values shown).

2.1.2 Calculation of Probable Response Rate

The Quebec survey attained a usable response rate of approximately 43 percent. The success of the Quebec survey may be attributed in part to the fact that the RAAQ has a favourable public image as a result of action on their part which resulted in reduced insurance rates for Quebec drivers. It was our impression that the public image of MTO is a more neutral one. Therefore, response rates for Ontario drivers were not expected to be as high as those obtained for Quebec. Taking into account that the typical mailed survey by private industry for commercial purposes in Ontario (in the last year) only achieves a 10 percent response rate; that the MTO has a neutral public image among Ontario drivers; that the Ontario survey was accompanied by an official letter of introduction from MTO; and that the subcontractors' names did not appear on either the questionnaires or return addresses (so as to avoid giving the impression of a "private industry" survey), a usable response rate of 30 percent was estimated for this Ontario survey. Assuming a 30% usable response rate, 12019 questionnaires were sent, 2000 to each age group, 6000 to each sex, and 4000 to each region. (The odd number, 12019, was necessary to ensure equal numbers were sent to each cell for each of the seven days of the week).

2.2 Questionnaire

The questionnaire was a booklet containing 3 or 5 double pages, for one-day and three-day logs respectively (copy of the booklet is shown in Appendix A). The first double page asked for demographic data, how and when the

driver learned to drive, details of the vehicles usually driven, and some global estimates of the amount of driving done in the previous week and previous year. The Quebec survey served as a starting point in the design of our questionnaire.

A number of modifications were made as a result of the response to that survey and to include questions in which MTO had a particular interest. The number of registered vehicles is sometimes used as a measure of exposure; a household with several vehicles indicates at least increased access. Thus this question was retained in the Ontario survey. However, the information requested about vehicles was simplified; only information on make, model, and year, but not the number of cylinders and car weight, was requested. The latter information is not readily available to Ontario respondents. It was felt sufficient to provide room for descriptions of three cars instead of four as did Quebec.

Given the time of year of the survey (late October through early November) and the fact that very few two-wheeled (motorized) vehicle riders were likely to be sampled, the question concerning mopeds and motorcycles no longer distinguished between the two, but asked for distance travelled for any two-wheeled vehicles. Since professional drivers tend to have much higher driving exposure levels than the "average" driver, questions were included which concern driving as a part of the respondent's employment. Respondents were asked for the number of licensed and non-licensed persons in their household. A question was included pertaining to the type of area in which the driver resided (ie. urban vs. rural). This was to allow a cross check of sampling by region classification. In addition, the Quebec survey question querying household income level was dropped. In its place was a question asking the driver's level of education, as this was thought to be a better surrogate measure of socioeconomic status (Kitagawa and Hauser, 1973).

The remainder of the booklet was devoted to the trip log; after a double page containing instructions and worked examples for keeping the trip diary,

there were one or three double pages where the driver recorded information on up to six trips taken for each day of the survey. A statement, "I used this log on (day of week and date)", appeared at the beginning of the trip log. Drivers were requested to fill out the log for a particular day(s) of the week. Descriptive questions concerning the car driven were included at the beginning of each trip column.

In order to assess the types of roads used for a particular trip, questions were added which asked "What speed limits applied to most or some of the roads you used during this trip?" and "Was all, most or some of the distance driven in urban (built-up), or rural areas?".

Quebec had provided recording columns for 12 trips per day of data collection. However, the results showed that most drivers did not exceed 6 trips per day. Thus, the Ontario instrument had only 6 trip columns for each day of data collection. Drivers who exceeded 6 trips on the day of data collection were asked to estimate the distance travelled for that day which was not included in the individual trip columns.

A graphic artist was contracted to carry out the design and layout for the main questionnaire. The overall size of the instrument was increased from 7" X 9 1/2" (Quebec instrument) to 8 1/2" X 11 1/2". The increase in size allowed for the use of a larger type which made the instrument more readable, and left more room for answers. This was felt to be especially important in a survey where half the strata were of drivers over 60 years of age.

2.3 Letters of Introduction

A letter of introduction from MTO accompanied all questionnaires encouraging the driver to participate and ensuring confidentiality of responses. Introductory letters were personalised with both driver name (e.g. Dear Ms. XXXX) and assigned date, as in the Quebec study. At this point all drivers were given the opportunity to respond in French if desired (3.1% of Ontario

residents state French is the language used at home). In order to respond in French, drivers had to call the survey team at a specified phone number. It was expected that about 360 of the 12019 receiving the mailed questionnaire would wish to make use of this telephone option. Of these, only 30% or 108 would be expected to respond. A record was kept of the number of requests for the French interview to aid MTO in preparing for future surveys. In addition, all 12019 drivers were informed that questions pertaining to the questionnaire could be answered by calling a specified number collect and asking for a particular person. Based on the Quebec response to this option, only 1% or 120 assistance calls were expected. Letters were modified to reflect variations in the strategies used with different groups of drivers, and were personalised by use of the driver's name. Questionnaires and envelopes were labeled with sufficient identification to track response (letters for the various groups are shown in Appendix B; a description of the coded identification label is given in Appendix C).

2.4 Sampling Period

Questionnaires were mailed to drivers between October 24 and November 9, 1988, to avoid winter conditions. With the narrow time frame and the variability in postal delivery times, drivers were asked to record data for specific days of the week, rather than for specific dates in the survey interval. For example, drivers were asked to record trips for the Thursday following receipt of the questionnaire. The assigned day(s) of the week appeared on the identification label placed on the front of the questionnaire. The assigned start day also appeared in the driver identification code. Ineligible drivers, defined as those who had moved, died or reported no longer driving were excluded, based on information obtained from questionnaires returned either by the post office, the respondent's family or the respondent respectively.

2.5 Reminder Letters

A reminder letter was sent in mid-November to all drivers. The initial intention was to employ a filtered follow-up system, whereby only drivers who had not responded would receive a reminder letter. However, due to the time constraints placed on collecting data, it was decided that a reminder letter would be sent to all 12019 drivers. The letter included a note of thanks and apology to those drivers who had already returned their completed questionnaire prior to receiving the reminder letter (See Appendix D).

2.6 Non-Response Questionnaire

In mid-December, a one-page questionnaire was sent to drivers whose responses had not been received within six weeks of mailing. This short questionnaire had several uses: a) to improve the information on reasons for non-response; b) to improve the response rate with respect to a small amount of exposure information; and c) to see whether the data from respondents were comparable to that of non-respondents, where comparable questions had been asked, and hence assess how generalisable the more detailed results were likely to be.

With respect to reasons for non-response, a question was asked to establish whether the driver had had problems with language. The question was translated into the 4 most frequently used home languages in Ontario besides English (ie. French - 3.1%, Italian - 1.9%, Chinese - 1.1%, and Portuguese - 0.8%) to help account for any sampled who may not have been able to read the questionnaire. Drivers were also asked if they did not drive for any reason or had other reasons for non-response. There were two questions requesting an estimate of driving done in the previous week and the vehicle driven most often. The same questions were used in the main survey, so that information from the non-response questionnaire could be compared to that from the respondents. To identify those drivers who would receive the non-response questionnaire, identification codes for all returned questionnaires (either completed or returned to sender) were recorded on a diskette

by the field work team (Market Pulse). This diskette was sent to MTO one week prior to the date for mailing the non-response questionnaire, so that the appropriate drivers would be selected and the non-response questionnaires personalised.

2.7 Methodological Studies

2.7.1 Trip Diary Length

The number of days assigned for the trip diary depended on the driver's age group. All drivers aged 25-59 were sent one-day logs and, as in the Quebec study, all those aged 60 or more were sent three-day logs. The longer interval for older drivers was used because the results from Quebec suggested that driving in this group is more sporadic, and hence more variable, despite reduced distances travelled. The log length which would elicit the best responses (in terms of number and quality) from the young drivers was not certain. Like the elderly drivers, young drivers tend not to drive much on any given day and, therefore, should be given a 3-day trip log to maximise the amount of information collected. However, the young driver may be more likely to respond to a 1-day log than to a 3-day log, because of the greater amount of work involved in the longer log. Consequently, a 1-day log may actually produce more information by eliciting a higher usable response rate. To test this possibility in each stratum of drivers under age 25, half the drivers were sent one-day logs and the remainder three-day logs.

2.7.2 Map Incentive

The impact of incentives and other details on survey motivation is highly variable. The influence of such details as the type of postage on the return envelope in a mailed questionnaire (metered, standard stamp, commemorative stamp) have been examined with some surprising results (Choi et al., 1990). In an effort to investigate this issue for this particular survey, a subsample of the 25-59 year old group (500) received a complimentary gift, namely an

Ontario Road Map provided by the MTO. This gift accompanied the mailed questionnaire, allowing for the testing of the effectiveness of an incentive on response rate.

2.7.3 Telephone Option

A concern when collecting data via a mailed survey is that a portion of the sample will be unable to respond due to language or literacy problems, or simply hesitate to respond because they are not certain of what is being asked of them. It was decided that 500 of the 25-59 year old group (from the 1500 who did not receive maps) would be given the option of either completing the mailed questionnaire and mailing it back or arranging for a telephone interview by calling a specified number collect. The name of the person to ask for differed from the name of the person who responded to requests for information, or for interviews in French. The interviewer was to make use of the mailed questionnaire as an aide memoire. The response of those offered personal contact was intended to help MTO evaluate the usefulness of a telephone option in future studies.

3.0 STATISTICAL ANALYSIS

3.1 Response Rates

Response rates for the main survey were calculated for each of the 36 strata, and for each subgroup within each strata as follows. The numerator included all trip logs returned to MTO from eligible drivers which contained data that could be coded and entered. The denominator was the total number of drivers sent the questionnaire, less those known to be ineligible. The effects of age group, gender and region on response rate were assessed by logistic regression. The same form of analysis was used within the age groups where a specific strategy was used, to assess the effects of the strategy, controlling for gender and region. The technique of logistic regression estimates a linear function to predict the logarithm of the odds of

response; the contribution of each factor (gender, region, incentive, etc.) is estimated and subjected to a chi square test of significance against the null hypothesis of no association between the factor and whether a response is received.

3.2 Answers to Survey Questions

The data gathered in this survey can be analysed and hopefully will be analysed in a multitude of ways. The aim of this project is to provide a basic report on exposure data and to leave more sophisticated corelational types of analysis for projects in the future. The answers to the survey questions are reported by age group, sex and region, in terms of frequency counts for variables such as the number of trips per day. For variables such as the age of first obtaining a license, where a cumulative distribution is more appropriate, the 50th and 90th percentiles have been reported. For measurement data, like the estimates of time in car and distance driven, means, medians and standard deviations have been provided.

In some cases responses indicated that individuals had misunderstood the question or were unable to make the estimates required of them. For example, odometer data reported by some people indicated they had travelled short distances during the day of reporting, but had been in the car for more than 10 hours. Prior to and during coding, codes were developed to annotate the data which was considered dubious, and to indicate the reason for so considering the data. These data were then removed from the analysis. In the results section, the classes of data considered dubious for each question are described. Also the number of responses considered dubious for each question are shown in the related table.

4.0 RESULTS

The results are reported as follows. First, response rates for all groups were examined, as well as response rates for those receiving and not receiving the telephone option or map incentive. Secondly, questionnaire data were examined for the 6 age groups of drivers. The 25-59 group was considered as the standard of comparison against which the driving patterns of older and younger drivers might be judged.

4.1 Response Rate

The response rates for the 36 strata are given in Table 1. The number of drivers not eligible to respond because the questionnaire did not reach them or they were no longer driving was small among those under 60, but became substantial among the elderly drivers. Overall response to the questionnaire was 36.3%, but varied from 12.6% to 53.6%, depending on the stratum. This was higher than the estimated response rate of 30% and lower, as expected, than the Quebec survey response rate of 42%. Few consistent differences in response rate across age groups, between male and female drivers or among regions of the province were found.

Response was lowest for drivers at the two extremes of age, over 80 years and under 25. With the exception of two strata, drivers aged 25 to 79 had response rates of 40-55%. Comparisons between ages must be treated with caution, as they are confounded with differences in the length of the diaries used. Among those with three-day logs, drivers aged 60-79 had better response rates than either those aged 80+ or those under 25. Drivers aged 25-59 all used one day trip-logs. Only in drivers under 25 can we assess the effects of different log lengths controlling for age and vice versa.

4.1.1 Length of the Trip Diary

The logistic regression results for log length, age group, gender and region, and the response rates for drivers by log length and age are presented in

TABLE 1
Overall Response Rates by Age Group, Gender, and Region of Drivers

SEX	MALE			FEMALE			
REGION	NORTH	S.URBAN	S.RURAL	NORTH	S.URBAN	S.RURAL	AGE
# Eligible	318	325	326	316	324	329	
# Returned	93	70	114	106	109	109	16-19
% Returned	29.3%	21.5%	35.0%	33.5%	33.6%	33.1%	
# Eligible	311	315	308	309	313	319	
# Returned	75	80	89	89	84	115	20-24
% Returned	24.1%	25.4%	28.9%	28.8%	26.8%	36.1%	
# Eligible	298	304	293	307	301	312	25-59
# Returned	128	99	151	140	132	143	CONTROL
% Returned	43.0%	32.6%	53.6%	45.6%	43.0%	45.8%	GROUP
# Eligible	303	296	301	297	301	309	
# Returned	134	150	145	142	147	151	60-69
% Returned	44.2%	50.7%	48.2%	47.8%	48.8%	48.9%	
# Eligible	262	260	256	246	262	276	
# Returned	100	106	126	105	98	130	70-79
% Returned	38.2%	40.8%	49.2%	42.7%	37.4%	47.1%	
# Eligible	167	230	195	181	201	193	
# Returned	37	29	39	39	37	45	80 +
% Returned	22.2%	12.6%	20.0%	21.6%	18.4%	23.3%	

Table 2. Normal regression analysis attempts to predict some outcome measurement (e.g., height) as a linear function of several other measurements (e.g., age, weight, etc). In the analysis of response rate, each respondent either returned the completed questionnaire or not. When the outcome is not a measurement and can only take two values, as in this case, a variant of ordinary regression, called logistic regression, has been very useful. The logarithm of the odds of response (the logit) for each stratum is used as the outcome variable in regression analysis; i.e.,

$$\ln \left(\frac{\text{responses}}{\text{no response}} \right)$$

The test of significance for each term in the logistic regression is, unlike normal regression, the chi-square test, to test the null hypothesis that the odds of response are identical at each level of the independent variables -- age (16-19 or 20-24), gender and region in this case.

Short trip logs were associated with a higher response rate; as indicated by the results in Table 2, the difference, though significant (P = 0.006), is not dramatic. The estimated increase in the odds of response, controlling for gender and region, is 21.7%. This means that a 30% response rate for a three-day log would be increased to 34.3% if a one-day log were used. The difference between long and short trip logs was consistent for male and female drivers in different regions of the province.

4.1.2 Map Incentive and Response Rate

The results of the logistic regression to compare the map with no incentives, by gender and region for drivers aged 25-59, are presented in Table 3. The effect of the map on the response rate was not consistent for men and women, as indicated by the significant interaction term Map*Sex (P = 0.018). Women who received the map incentive were significantly more likely to respond than women who received no incentive. Conversely, men who received the map incentive were somewhat less likely to respond than

TABLE 2

I. Test Statistics for Logistic Regression: LogLength, Age Group, Sex and Region

SOURCE	DF	CHI-SQUARE	PROB
Intercept	1	580.04	0.0000
Age	1	1.99	0.1587
Sex	1	12.53	0.0004
Age*Sex	1	0.02	0.8913
Region	2	13.05	0.0015
Age*Region	2	0.57	0.7525
Sex*Region	2	1.80	0.4057
Age*Sex*Region	2	7.79	0.0203
Log Length	1	7.63	0.0058

II. Response Rates by LogLength for Different Driver Age Groups

Age Group: 16 - 19

	One-Day	Three-Day
Total # Eligible	964	973
# Returned	310	291
% Returned	32.2%	29.9%

Age Group: 20 - 24

	One-Day	Three-Day
Total # Eligible	929	945
# Returned	296	245
% Returned	31.9%	25.9%

TABLE 3

Test Statistics for Logistic Regression: Map, Sex and Region

SOURCE	DF	CHI-SQUARE	PROB
Intercept	1	9.22	Ø.ØØ24
Map	1	Ø.34	Ø.56Ø9
Sex	1	5.66	Ø.Ø174
Map*Sex	1	5.55	Ø.Ø184
Region	2	13.75	Ø.ØØ1Ø
Map*Region	2	1.78	Ø.41Ø6
Sex*Region	2	13.46	Ø.ØØ12
Map*Sex*Region	2	2.78	Ø.2491

Response Rates for Map and No Incentives for Male and Female Drivers Aged 25 - 59

MALE DRIVERS

	Map	No Incentive
Total # Eligible	234	435
# Returned	94	194
% Returned	4Ø.2%	44.6%

FEMALE DRIVERS

	Map	No Incentive
Total # Eligible	237	449
# Returned	126	2Ø1
% Returned	53.2%	44.8%

men who received no incentive. The map had equivalent effects on men and women in each of the three regions (P = 0.249) although regional differences in response for men and women (P = 0.001) were statistically highly significant.

4.1.3 Telephone Option and Response Rate

Of 504 drivers in the 25-59 year old group who were offered the chance to respond to the survey by telephone, only 3 provided survey information by telephone. While it might be argued that providing alternate means of response impresses the respondent with the importance of participation (Warwick & Leninger, 1975), the option of telephone response in this survey had no significant effect on response rate (P = 0.343).

4.1.4 Survey of Non-Respondents

Of the 8000 sent non-response questionnaires, 3169 drivers returned them to MTO. Some of the 3169 drivers had already returned a trip log (N = 486). Others returned incomplete questionnaires (N = 97), leaving 2586 usable non-response questionnaires. Of these, 16 drivers indicated problems with language which made response difficult and 808 had stopped driving altogether. The balance of 1762 drivers had provided a small amount of information on their recent driving exposure. When the numbers who were no longer driving were added to the other "ineligible" drivers identified from the returns of the main questionnaire and the rest were included as respondents, the overall response rate to either questionnaire becomes 58.5%.

4.2 Main Survey Results

The following sections detail the results of the main questionnaire. The answers to each question are reported separately together with discussion of differences in response by age, sex or region.

4.2.1 Age License was Obtained (Questions 1 and 2)

The median age for each cell for obtaining driving licenses depended on age group, sex and region (Table 4). For each cell, both 50th percentile (median) and 90th percentile ages of obtaining a license were calculated. (Taking the 80 + northern males as an example, the 50th percentile age was 23. That is, half of the group had obtained a license by the time they were 23 years of age. The 90th percentile age was 43. Thus, 90% of the group had obtained a license by the age of 43. The remaining 10% of the group were older than 43 when they obtained a license).

From Table 4, it can be seen that the older drivers had attained their licenses later, with the older females (ages 70 +) being the latest, with a median age of 35. As would be expected by virtue of the age at which they were selected, the youngest drivers (16-19) obtained their licenses earliest, with 50% holding a license by the age of 16. This was also true for the 20-24 year old group, with the exception of the females living in the south, where the 50th percentile age was 17. For all age groups aged 25 years or more, males living in the rural south had obtained licenses earliest : the median was 17 in the control group, up to age 19 for drivers over 80. With few exceptions, notably the youngest drivers and 20-24 year old drivers in the north (where males and females were the same), male drivers were licensed earlier than female drivers in each region and age group. The differences were far more pronounced for the older drivers. There were no regional differences among the youngest drivers; in other age groups, drivers in the south rural areas obtained their licenses earliest, followed by the northern areas and the southern urban areas.

The 90th percentile ages were also calculated for each cell. The 90th percentile value gives an idea of the variation within each cell with respect to age of obtaining a license. For the control group, the lowest 90th percentile age was 24 for the southern rural males. The highest was 58 for the southern rural 80+ females.

TABLE 4

Q2 HOW OLD WERE YOU WHEN YOU GOT YOUR LICENCE?

SEX	MALE			FEMALE			
REGION	NORTH	S.URBAN	S.RURAL	NORTH	S.URBAN	S.RURAL	AGE
Number	97	70	105	107	104	110	
50th Percentile	16	16	16	16	16	16	16-19
90th Percentile	17	17	17	17	17	17	
Number	72	80	88	95	82	117	
50th Percentile	16	16	16	16	17	17	20-24
90th Percentile	18	21	17	20	19	20	
Number	123	94	156	138	128	144	25-59
50th Percentile	17	18	17	20	21	18	CONTROL
90th Percentile	28	33	24	40	37	32	GROUP
Number	145	153	140	142	153	153	
50th Percntile	19	20	18	30	29	24	60-69
90th Percntile	31	34	27	50	45	45	
Number	101	107	131	104	100	135	
50th Percentile	19	20	18	35	30	22	70-79
90th Percentile	38	43	33	56	53	50	
Number	35	29	36	37	37	45	
50th Percntile	23	24	19	35	23	23	80 +
90th Percntile	43	46	34	56	47	58	

4.2.2 Method of Learning to Drive (Question 3)

For drivers of age 25 up to 79, in 15 of 18 cells, respondents' most frequent method of learning to drive was with parents/family (Table 5). The exceptions were males living in the north aged 60-79 years, who most frequently reported being self-taught, and females living in the urban south aged 25-59, who most frequently took driver education. Females in the 80+ group also reported parents/family as the most frequent method, while males in this age group reported being self-taught as the most frequent method. For drivers younger than 25, driver education was the most frequent method of learning to drive, with the exceptions of northern males and southern rural females in the 20-24 year old group, for whom parents/family was the most frequent method. For all age groups and regions, males were much more likely to report being self-taught than females, while females were much more likely to report having taken driver education than males. The differences between males and females become much more pronounced with increasing age. For both age and sex groups (with the single exception of 20-24 year old males), urban drivers were more likely to report having taken driver education than non-urban drivers.

4.2.3 Employment as a Driver (Question 11a)

The strata with higher proportions reporting employment as a driver are males aged 16 to 59 years (Table 6). Reporting driving for hire is infrequent for all strata of women, and for all drivers aged 60-79. In the groups over 80, the numbers responding were too low to make reasonable estimates of the percentages employed as drivers. In general, drivers who report employment as a driver are more common among those living in the north, and least common in the urban south.

TABLE 5

Q3 HOW DID YOU LEARN TO DRIVE?

SEX	MALE			FEMALE			
REGION	NORTH	S.URBAN	S.RURAL	NORTH	S.URBAN	S.RURAL	AGE
Number	98	70	109	108	107	110	
Self-Taught	10.2%	4.3%	11.0%	0.9%	-	-	
Parents/Family	35.7%	17.1%	38.5%	43.5%	33.6%	40.9%	16-19
Driver's Ed	53.1%	78.6%	49.5%	54.6%	66.4%	57.3%	
Other	4.1%	-	2.7%	1.9%	-	1.8%	
Number	73	82	89	97	85	119	
Self-Taught	8.2%	13.5%	5.6%	4.1%	3.6%	5.0%	
Parents/Family	53.4%	35.4%	24.7%	50.5%	32.9%	47.0%	20-24
Driver's Ed	38.4%	52.4%	65.1%	45.4%	62.4%	45.4%	
Other	2.7%	2.4%	4.5%	1.0%	2.4%	3.4%	
Number	121	95	156	137	128	142	
Self-Taught	25.3%	8.5%	29.5%	7.3%	0.8%	9.2%	25-59
Parents/Family	56.2%	50.6%	41.0%	54.8%	42.2%	54.9%	CONTROL
Driver's Ed	20.7%	42.1%	26.9%	35.8%	58.6%	39.4%	GROUP
Other	7.4%	9.3%	7.7%	8.0%	7.0%	3.5%	
Number	140	149	140	142	150	151	
Self-Taught	40.0%	29.5%	38.0%	4.2%	1.4%	6.0%	
Parents/Family	33.5%	32.2%	45.8%	62.0%	57.4%	62.9%	60-69
Driver's Ed	10.0%	17.4%	7.0%	27.5%	36.0%	23.2%	
Other	18.6%	20.9%	9.8%	6.3%	6.0%	8.6%	
Number	99	105	130	104	96	132	
Self-Taught	51.5%	29.4%	37.6%	7.8%	7.3%	10.6%	
Parents/Family	32.3%	42.2%	51.5%	61.1%	50.0%	71.2%	70-79
Driver's Ed	6.1%	20.6%	7.7%	28.2%	37.5%	11.3%	
Other	13.1%	12.8%	6.9%	9.7%	9.3%	9.3%	
Number	34	28	35	37	35	44	
Self-Taught	44.1%	39.3%	54.3%	8.1%	5.7%	9.1%	
Parents/Family	26.4%	35.7%	31.4%	59.5%	60.0%	72.8%	80 +
Driver's Ed	17.6%	10.7%	5.7%	24.3%	14.3%	6.8%	
Other	11.7%	14.3%	8.6%	8.1%	20.0%	13.6%	

TABLE 6

Q11 Are You Employed as a Driver?

SEX		MALE			FEMALE		
REGION	NORTH	S.URBAN	S.RURAL	NORTH	S.URBAN	S.RURAL	AGE
Number	90	69	105	105	106	107	
No	85.6%	94.2%	87.6%	98.1%	100.0%	100.0%	
HvyTruck/LrgBus	2.2%	-	2.9%	1.0%	-	-	16-19
LghtDel/Taxis	10.0%	4.3%	9.5%	0.9%	-	-	
Other	2.2%	1.4%	-	-	-	-	
Number	68	80	86	97	83	118	
No	83.8%	93.7%	88.4%	100.0%	98.8%	97.5%	
HvyTruck/LrgBus	8.8%	3.7%	7.0%	-	-	0.8%	20-24
LghtDel/Taxis	5.9%	2.5%	3.5%	-	1.2%	0.8%	
Other	1.5%	-	1.2%	-	-	0.8%	
Number	118	89	149	133	126	131	
No	86.4%	92.1%	91.3%	97.7%	100.0%	98.5%	25-59
HvyTruck/LrgBus	7.6%	4.4%	6.7%	0.8%	-	0.8%	CONTROL
LghtDel/Taxis	3.4%	3.3%	1.3%	0.8%	-	0.8%	GROUP
Other	2.5%	-	0.7%	0.8%	-	-	
Number	125	140	132	127	133	136	
No	96.8%	95.7%	95.5%	100.0%	100.0%	99.3%	
HvyTruck/LrgBus	0.8%	0.7%	0.8%	-	-	-	60-69
LghtDel/Taxis	2.4%	2.8%	2.3%	-	-	-	
Other	-	0.7%	1.5%	-	-	0.7%	
Number	90	98	116	104	88	117	
No	96.7%	98.0%	99.1%	98.8%	100.0%	100.0%	
HvyTruck/LrgBus	-	1.0%	-	1.2%	-	-	70-79
LghtDel/Taxis	2.2%	-	-	-	-	-	
Other	1.1%	1.0%	0.9%	-	-	-	
Number	31	25	32	31	30	37	
No	96.8%	100.0%	96.9%	100.0%	93.3%	97.3%	
HvyTruck/LrgBus	3.2%	-	-	-	3.3%	-	80 +
LghtDel/Taxis	-	-	3.1%	-	3.3	2.7%	
Other	-	-	-	-	-	-	

4.2.4 Kilometres Driven in the Past 12 Months as Part of Employment (Question 11b)

In order to answer questions 11b, 12 and 14a, respondents had to make global estimates of distance driven over a period of time. No cues or aids were given to help make these estimates. Such global estimates have been collected in other surveys of exposure. Therefore, we wished to obtain comparable data in this survey so that it might be compared with the more precise estimates given by the trip diary data. Obviously, less faith can be placed in the global estimates than in the trip diary data.

As would be expected from few respondents reporting they were employed as drivers, few respondents reported distance travelled as part of employment (Table 7). Males in the southern rural area reported larger mean distances travelled compared to males in the other two regions. However, this is based on small cell sizes (maximum size 13) and is associated with large standard deviations, indicating great variability in the estimates.

4.2.5 Kilometres Driven During Past 12 Months Excluding Employment (Question 12)

In answers to this question, men reported driving considerably more than women in all regions and age groups, and both the very young and older drivers drove less than others (Table 8). Men in the 20 - 24 and 25 - 59 year old age groups reported driving the most, and women over 70, the least. In most sex and age groups, drivers in rural communities in southern Ontario reported higher numbers of kilometres driven, than either urban drivers or northern drivers.

4.2.6 Kilometers Driven During the Past 7 Days (Question 14a)

The answers to this question were consistent with the answers to question 12 about yearly driving. Again 20-24 and 25-59 year old males reported most driving and older females least. Males reported more driving than females

TABLE 7
Q11b Kilometres driven in past 12 months as part of Employment

SEX	MALE			FEMALE			
REGION	NORTH	S.URBAN	S.RURAL	NORTH	S.URBAN	S.RURAL	AGE
Number	10	4	12	2	-	-	
Median	3125	2415	5000	1000			16-19
Mean	13295	4366	59538	1500	-	-	
StndardDev	18959	5247	84091	707	-	-	
Number	11	4	10	-	-	2	
Median	6200	2512	24150	-	-	966	20-24
Mean	32527	24604	48689	-	-	4508	
StndardDev	60812	26512	55975	-	-	5009	
Number	13	7	10	3	-	2	
Median	16100	32500	32000	20000	-	145	25-59
Mean	34716	32688	75200	18667	-	475	CONTROL
StndardDev	38531	17955	79070	12055	-	467	GROUP
Number	2	5	5	-	-	-	
Median	10000	21000	4400	-	-	-	60-69
Mean	19490	32032	6584	-	-	14820	
StndardDev	13421	39089	6612	-	-	-	
Number	2	-	1	1	-	-	
Median	8050	-	-	-	-	-	70-79
Mean	44275	-	2400	18000	-	-	
StndardDev	51230	-	0	0	-	-	
Number	1	-	1	-	2	1	
Median	-	-	-	-	10000	-	80 +
Mean	60000	-	500	-	16720	19320	
StndardDev	-	-	-	-	8867	-	

TABLE 8
Q12 Kilometres driven in past 12 months excluding Employment

SEX	MALE			FEMALE			
REGION	NORTH	S.URBAN	S.RURAL	NORTH	S.URBAN	S.RURAL	AGE
Number	94	68	104	100	97	88	
Median	8050	5000	14691	3000	3500	7500	16-19
Mean	12140	13292	19029	7133	6269	12844	
StndardDev	12577	17844	21982	14510	8886	13929	
Number	69	78	84	92	82	108	
Median	16000	12880	25000	6440	7800	10000	20-24
Mean	19621	18148	29311	11811	13238	14091	
StndardDev	19384	16255	21049	20840	16964	12836	
Number	116	92	148	121	113	130	
Median	15000	18000	19400	6000	8000	8050	25-59
Mean	22229	20335	24938	9073	10764	12114	CONTROL
StndardDev	26627	17495	20038	9361	12641	12897	GROUP
Number	131	143	134	122	138	142	
Median	10000	13000	14490	4000	5500	5023	60-69
Mean	12775	14183	17337	6363	8701	7992	
StndardDev	9294	9559	11657	7834	13182	7999	
Number	92	102	117	88	84	118	
Median	8000	10000	11720	2500	3300	3220	70-79
Mean	11089	11302	13710	5457	5005	5753	
StndardDev	11790	8143	9892	7998	5525	8709	
Number	32	26	35	29	33	35	
Median	6440	5000	8050	2415	2000	4000	80 +
Mean	9676	8585	12216	4235	4997	7764	
StndardDev	10689	11311	10549	7331	8976	13272	

in their same age group. Also southern rural drivers reported driving more than drivers in other areas, with the single exception of 60-69 year old females (See Table 9).

4.2.7 Family Status (Question 16)

With the exception of those younger than 25 and females older than 70, approximately 3/4 of the respondents in each cell reported themselves as married. For older females this ranged from 40.6 to 47.1% in the 70-79 year old group, down to 18.9 to 22.7% in the 80+ group (See Table 10). Drivers younger than 25 were most likely to report themselves as single, ranging from 94.5% of southern rural 16-19 year old females to a low of 51.3% of southern rural 20-24 year old females. Of the control group drivers, 12.6 to 22.8% reported themselves as single, the lowest percent being the southern urban females and the highest percent being the southern urban males. In the older group of drivers, between 2.9 and 12.5% reported themselves as single, the highest percentage being for older southern urban females. Among the control group drivers 4.3 to 13.4% reported themselves as being widowed/separated/divorced. This percentage was much higher for female drivers, and increased with age, with 75.7% of the northern 80+ females so reporting.

4.2.8 Employment Status (Question 17)

As expected, the 16-19 year old group were most likely to report themselves as full-time students (44.5 - 60.0%), the 20-59 year olds as employed (50.7 - 71.4%), and those 60 and over as retired (44.0 - 96.3%) (See Table 11). In the 16-19 year old group a substantial number were employed (24.8 - 46.4%), while in the 20-24 year old group, a substantial number were full-time students (12.5 - 22.0%).

In the 25-59 year old group, between 22.1 and 23.0% of the males, and between 7.3 and 14.8% of the females reported themselves as retired. The high rate of reporting retirement is unexpected in a group whose age ranges

TABLE 9

Q14a Kilometres driven during past 7 days:

SEX	MALE			FEMALE			
REGION	NORTH	S.URBAN	S.RURAL	NORTH	S.URBAN	S.RURAL	AGE
Number	89	62	100	79	82	84	
Median	145	100	242	70	87	145	16-19
Mean	267	259	388	124	149	243	
StndardDev	371	395	482	129	188	328	
Number	68	70	82	80	71	108	
Median	290	275	400	125	120	175	20-24
Mean	381	400	530	187	221	254	
StndardDev	349	392	490	176	234	222	
Number	115	92	150	126	116	126	
Median	175	300	315	81	100	161	25-59
Mean	383	371	466	205	168	217	CONTROL
StndardDev	539	317	491	355	177	195	GROUP
Number	131	144	136	108	125	135	
Median	161	200	260	60	75	100	60-69
Mean	244	292	354	147	147	149	
StndardDev	288	288	337	270	186	140	
Number	88	96	115	83	84	110	
Median	120	140	193	48	62	80	70-79
Mean	193	245	258	123	97	135	
StndardDev	273	323	258	249	103	184	
Number	31	22	35	26	33	32	
Median	100	80	100	39	48	90	80 +
Mean	207	138	259	72	108	133	
StndardDev	330	152	540	82	184	152	

TABLE 10

Q16 Family Status

SEX		MALE			FEMALE		
REGION	NORTH	S.URBAN	S.RURAL	NORTH	S.URBAN	S.RURAL	AGE
Number	98	70	110	100	100	110	
Married	11.2%	5.7%	16.4%	8.3%	7.4%	5.5%	16-19
Single	86.7%	94.3%	83.6%	91.7%	92.6%	94.5%	
Widowd/Divorcd	2.0%	-	-	-	-	-	
Number	73	83	89	97	85	119	
Married	27.4%	37.3%	33.7%	41.2%	41.2%	45.4%	20-24
Single	69.9%	60.2%	66.3%	57.7%	56.5%	51.3%	
Widowd/Divorcd	2.7%	2.4%	-	1.0%	2.4%	3.4%	
Number	122	92	155	138	127	143	
Married	73.8%	72.8%	79.4%	72.5%	74.0%	76.9%	25-59
Single	19.7%	22.8%	14.8%	15.2%	12.6%	14.0%	CONTROL
Widowd/Divorcd	6.6%	4.3%	5.8%	12.3%	13.4%	9.1%	GROUP
Number	141	152	144	142	149	153	
Married	85.8%	91.4%	89.6%	72.5%	65.1%	73.9%	60-69
Single	2.8%	2.0%	2.1%	3.5%	6.0%	2.6%	
Widowd/Divorcd	11.3%	6.6%	8.3%	23.9%	28.9%	23.5%	
Number	98	104	129	102	96	131	
Married	79.8%	77.9%	79.8%	47.1%	40.6%	46.6%	70-79
Single	4.0%	3.8%	6.2%	2.9%	12.5%	3.8%	
Widowd/Divorcd	16.2%	18.3%	14.0%	50.0%	46.9%	49.6%	
Number	32	28	35	37	36	44	
Married	68.7%	75.0%	74.3%	18.9%	22.2%	22.7%	80 +
Single	3.1%	-	8.6%	5.4%	8.3%	9.1%	
Widowd/Divorcd	28.1%	25.0%	17.1%	75.7%	69.4%	68.2%	

TABLE 11
Q17 Employment

SEX	MALE			FEMALE			
REGION	NORTH	S.URBAN	S.RURAL	NORTH	S.URBAN	S.RURAL	AGE
Number	98	70	110	108	108	109	
Employed	36.7%	31.4%	46.4%	28.7%	26.9%	24.8%	
Retired	1.0%	-	0.9%	0.9%	-	-	16-19
Homemaker	-	-	-	0.9%	0.9%	-	
F/T Student	46.9%	54.3%	44.5%	53.7%	56.5%	60.6%	
Other	15.3%	14.3%	8.1%	15.8%	15.7%	14.8%	
Number	73	82	88	97	85	119	
Employed	68.5%	70.7%	71.6%	52.6%	63.5%	63.0%	
Retired	-	-	1.1%	-	-	-	20-24
Homemaker	-	-	-	11.3%	5.9%	10.1%	
F/T Student	19.2%	22.0%	12.5%	27.8%	22.4%	18.5%	
Other	12.3%	7.3%	14.7%	8.2%	8.2%	8.4%	
Number	122	94	154	137	125	142	
Employed	69.7%	71.0%	71.4%	54.7%	64.0%	50.7%	25-59
Retired	23.0%	22.6%	22.1%	7.3%	10.4%	14.8%	CONTROL
Homemaker	-	-	-	26.3%	16.8%	21.8%	GROUP
F/T Student	5.7%	3.2%	1.9%	7.3%	2.4%	4.9%	
Other	1.6%	3.3%	2.6%	4.4%	6.4%	7.7%	
Number	140	149	144	142	150	150	
Employed	18.6%	32.2%	34.7%	12.0%	19.3%	8.7%	
Retired	76.4%	65.8%	65.3%	59.9%	44.0%	52.3%	60-69
Homemaker	-	-	-	27.5%	35.3%	37.6%	
F/T Student	-	0.7%	-	-	-	-	
Other	5.0%	1.4%	-	0.7%	1.4%	1.3%	
Number	98	103	126	100	94	130	
Employed	12.2%	8.7%	12.7%	2.0%	3.2%	-	
Retired	86.7%	91.3%	85.7%	79.0%	74.5%	69.2%	70-79
Homemaker	-	-	-	19.0%	21.3%	30.8%	
F/T Student	-	-	-	-	-	-	
Other	1.0%	-	1.6%	-	1.1%	-	
Number	32	27	36	36	35	44	
Employed	15.6%	3.7%	16.7%	2.8%	8.6%	2.3%	
Retired	81.2%	96.3%	80.6%	75.0%	74.3%	79.5%	80 +
Homemaker	-	-	-	22.0%	17.1%	18.2%	
F/T Student	-	-	-	-	-	-	
Other	3.1%	-	2.8%	-	-	-	

between 25 and 59; even if all of those over 55 were retired, they would constitute only 1/7 or 14% of the whole cell. It is possible that some who were actually unemployed reported themselves as retired. It is also possible that retired people, particularly men, were more likely to respond because they had more time to do so than those who were employed.

4.2.9 Education (Question 18)

The increased tendency towards more years of schooling among the young, the tendency for girls to stay in school longer, and the tendency for urban dwellers to have attained higher levels of education than rural dwellers is reflected in the education levels reported (Table 12). Older male (60+) northern and southern rural drivers had the lowest levels of education with between 32.9% and 59.4% reporting themselves as having Grade 8 or less education. With the single exception of 60 - 69 year old females living in the north, women reported higher levels of education than men in the same age group and same region. With respect to region, drivers in southern urban areas reported higher levels of education than drivers in other areas.

It should be recognised that women with more education are also more likely to hold a driver's license. The same is not true for men, where licenses are common at all levels of education. Perhaps, also, this reflects a pattern of motorization, which is complete in men, but still in progress in women.

4.2.10 Number in Household (Question 19)

The answers to questions 19, 20, 21a and b were combined to give household size (Table 13). This included the driver, children under the age of 16 (21a and b), licensed (19) and unlicensed (20) persons of 16 years or older. Amongst the youngest drivers, 85% or more lived in households of 3 or more people. Amongst drivers in the control group, approximately 1/3 lived in households with 2 people and about 40% in households of size 3 or 4. Amongst the older drivers, as would be expected, household size was smal-

TABLE 12
Q18 Education

SEX	MALE			FEMALE			
REGION	NORTH	S.URBAN	S.RURAL	NORTH	S.URBAN	S.RURAL	AGE
Number	97	7Ø	1Ø9	1Ø7	1Ø7	11Ø	
Grade8 or less	3.1%	1.4%	2.8%	-	-	Ø.9%	
SomeHghSchool	4Ø.2%	32.9%	43.1%	2Ø.6%	26.2%	2Ø.9%	16-19
HghSchool Grad	22.7%	34.3%	26.6%	21.5%	2Ø.6%	2Ø.Ø%	
PostSecondary	34.Ø%	31.5%	27.6%	57.9%	53.3%	58.2%	
Number	73	83	89	97	85	119	
Grade8 or less	1.4%	1.2%	5.6%	-	-	3.4%	
SomeHghSchool	9.Ø%	1Ø.8%	12.4%	11.3%	3.5%	12.6%	2Ø-24
HghSchool Grad	21.9%	21.7%	28.1%	19.6%	15.3%	16.8%	
PostSecondary	67.1%	66.3%	53.9%	69.Ø%	81.2%	67.2%	
Number	122	94	153	138	127	143	
Grade8 or less	13.1%	11.7%	15.Ø%	11.6%	Ø.8%	11.2%	25-59
Some HghSchool	28.7%	24.5%	31.4%	25.4%	19.7%	26.6%	CONTROL
HghSchool Grad	22.1%	19.1%	18.3%	24.6%	27.6%	21.Ø%	GROUP
PostSecondary	36.1%	44.6%	35.3%	38.4%	51.9%	41.3%	
Number	14Ø	15Ø	144	14Ø	15Ø	15Ø	
Grade8 or less	4Ø.7%	28.Ø%	32.9%	29.3%	1Ø.Ø%	25.3%	
Some HghSchool	27.9%	27.3%	38.5%	32.9%	27.3%	27.3%	6Ø-69
HghSchool Grad	1Ø.7%	15.3%	9.1%	19.3%	29.3%	2Ø.7%	
PostSecondary	2Ø.7%	29.3%	19.6%	18.7%	33.3%	26.7%	
Number	98	1Ø3	125	1Ø1	95	129	
Grade8 or less	45.9%	13.6%	41.6%	21.8%	17.9%	18.6%	
Some HghSchool	31.6%	37.9%	34.4%	32.7%	2Ø.Ø%	3Ø.2%	7Ø-79
HghSchool Grad	13.3%	21.4%	1Ø.4%	18.8%	34.7%	21.7%	
PostSecondary	9.1%	27.2%	13.6%	26.8%	27.4%	29.5%	
Number	32	26	36	37	36	44	
Grade8 or less	59.4%	3Ø.8%	5Ø.Ø%	29.7%	13.9%	27.3%	
Some HghSchool	18.8%	26.9%	22.2%	21.6%	27.8%	13.	8Ø +
HghSchool Grad	6.2%	7.7%	2.8%	5.4%	13.9%	15.9%	
PostSecondary	15.6%	34.6%	25.Ø%	43.2%	44.4%	43.3%	

TABLE 13

Number in Household

SEX	MALE			FEMALE			
REGION	NORTH	S.URBAN	S.RURAL	NORTH	S.URBAN	S.RURAL	AGE
Number	98	71	111	108	108	110	
One	2.0%	1.4%	0.9%	1.9%	0.9%	3.6%	
Two	7.1%	4.2%	5.4%	12.0%	3.7%	9.1%	16-19
Three/Four	63.3%	57.7%	59.4%	51.9%	52.7%	55.4%	
Five or more	27.5%	36.5%	34.2%	34.4%	42.5%	31.8%	
Number	74	85	89	98	85	120	
One	8.1%	7.1%	2.2%	6.1%	3.5%	2.5%	
Two	17.6%	28.2%	23.6%	25.5%	31.8%	30.8%	20-24
Three/Four	52.7%	41.2%	58.4%	47.9%	42.4%	45.8%	
Five or more	21.7%	23.7%	15.7%	20.3%	22.4%	20.8%	
Number	123	95	156	138	128	144	
One	13.8%	15.8%	10.9%	8.0%	13.3%	11.1%	25-59
Two	26.0%	31.6%	33.3%	33.3%	33.6%	27.8%	CONTROL
Three/Four	37.4%	34.7%	40.4%	42.8%	39.8%	40.3%	GROUP
Five or more	22.7%	17.9%	15.3%	15.9%	13.3%	20.9%	
Number	145	153	146	142	153	153	
One	24.1%	20.3%	17.8%	25.4%	28.1%	17.0%	
Two	55.9%	53.6%	61.0%	62.0%	60.1%	69.3%	60-69
Three/Four	17.2%	22.8%	18.4%	11.3%	10.5%	12.5%	
Five or more	2.8%	3.3%	2.8%	1.4%	1.3%	1.3%	
Number	101	107	131	104	100	135	
One	37.6%	44.9%	32.8%	48.1%	52.0%	54.1%	
Two	49.5%	46.7%	56.5%	43.3%	37.0%	39.3%	70-79
Three/Four	8.9%	8.4%	9.2%	6.7%	10.0%	6.6%	
Five or more	4.0%	-	1.6%	2.0%	1.0%	-	
Number	35	29	36	37	37	45	
One	48.6%	44.8%	36.1%	62.2%	73.0%	75.6%	
Two	40.0%	48.3%	27.8%	29.7%	21.6%	20.0%	80 +
Three/Four	11.5%	6.8%	27.8%	5.4%	5.4%	4.4%	
Five or more	-	-	8.4%	2.7%	-	-	

ler with numbers living alone increasing with age. Amongst drivers over 70, more women lived alone than men, reflecting the greater longevity of women.

4.2.11 Trip Log Data: No. of Trips per Day

In the trip log, drivers were asked to use one column for each trip that they drove. The instructions they were given were as follows, "You should start a new column each time you park your vehicle, or if you pick up or drop off a passenger. Drivers were also given a completed example. Drivers were instructed that if driving was their main job, they should not report distance travelled as part of employment.

The number of trips taken during each day the diary was kept is given in Table 14. Data concerning the number of trips were considered dubious and excluded if 50% or more of trips recorded appeared to be round trips with long times and short distances, or a round trip was recorded as one trip with total time out of the car not stated, or the trips had to be combined due to missing odometer readings to get total distance travelled (Table 14).

In order to make use of both one-day and three-day logs in the analysis, the decision was made to consider each day reported as a person-day. All three days of data were used for the older groups. For those drivers in the younger groups who received a three day log, the first day only is reported on here so that those receiving the three day logs do not contribute a disproportionate amount of data compared to those who received the one day logs. However, for the information of the reader, the various estimates of number of trips, time in car, and distance driven were calculated using three day logs only, one day logs only and one day logs combined with the first day of the three day logs. These three different ways of calculating the data are shown in Appendix F.

We should note that comparison of older drivers (3 day) with control (1 day) would be confounded by the difference in diary length if these tables

TABLE 14

SEX	MALE			FEMALE			
REGION	NORTH	S.URBAN	S.RURAL	NORTH	S.URBAN	S.RURAL	AGE
Number of Trips calculated using 1 day and 1st of 3 Days.							
Number	94	67	105	105	100	105	
Dubious	4%	6%	6%	3%	7%	5%	
% Zero Trips	36%	37%	23%	50%	52%	49%	16-19
One Trip	9%	10%	9%	7%	4%	9%	
Two Trips	16%	15%	31%	20%	16%	15%	
Three or more	39%	37%	38%	24%	27%	28%	
Number	70	83	83	91	81	116	
Dubious	6%	2%	7%	8%	5%	3%	
% Zero Trips	20%	30%	12%	39%	36%	36%	20-24
One Trip	11%	4%	11%	9%	9%	7%	
Two Trips	23%	19%	23%	17%	25%	24%	
Three or more	46%	47%	54%	36%	31%	33%	
Number of Trips calculated using each day of 3-day log counted as one record.							
Number	119	89	149	127	121	132	
Dubious	3%	7%	5%	9%	6%	9%	25-59
% Zero Trips	30%	16%	20%	37%	34%	36%	CONTROL
One Trip	13%	15%	19%	12%	11%	11%	GROUP
Two Trips	21%	21%	27%	14%	18%	25%	
Three or more	36%	48%	35%	37%	37%	27%	
Number	216	225	276	225	210	282	
Dubious	29%	30%	30%	28%	30%	30%	
% Zero Trips	50%	32%	38%	60%	54%	66%	70-79.
One Trip.	25%	24%	33%	20%	20%	22%	
Two Trips	18%	25%	18%	15%	14%	9%	
Three or more	7%	19%	11%	6%	14%	4%	
Number of Trips calculated using all 3 Days.							
Number	312	351	339	336	381	366	
Dubious	39%	31%	29%	27%	13%	15%	
% Zero Trips	34%	27%	27%	57%	19%	16%	60-69
One Trip	24%	17%	25%	21%	6%	3%	
Two Trips	20%	27%	24%	12%	4%	4%	
Three or more	23%	30%	24%	11%	5%	1%	
Number	60	60	78	78	66	99	
Dubious	75%	45%	38%	42%	68%	36%	
% Zero Trips	73%	52%	62%	72%	76%	77%	80 +
One Trip	15%	32%	15%	17%	6%	15%	
Two Trips	7%	13%	14%	9%	11%	5%	
Three or more	7%	3%	9%	3%	8%	3%	

are used. Because different age groups were asked to complete diaries of different lengths, the estimates of exposure between different age groups may not be strictly comparable; that is, we may have had a greater response from high exposure drivers, asked for a short diary, than from those sent a long diary. There is some evidence of this in comparing the distances driven by drivers 16-24 sent one-day and three-day diaries.

Males in the 20-24 and 25-59 year old age groups were least likely to report zero trips. Women were more likely than men in their own age group to report zero trips. In the 16-19 year old age group, as many males reported zero trips as did males in the 60-69 year old age group. Men in the 20-24 year old group in the southern rural areas reported most trips, with 3 or more trips being the most frequently reported category (54.2%). Less than 10% of the drivers in the control group reported 6 or more trips, while amongst the older drivers less than 10% (approximately) reported 4 or more trips per day. The above findings simply reflect differences in the amount of driving done as measured by time or distance.

4.2.12 Trip Log Data: Time in the Car

Time spent in the car was calculated by taking the difference between end times and start times for each reported trip and subtracting from that, the total time spent out of the car during the course of the trip. Data were considered dubious and excluded if they met any of the following criteria: 50% or more of the trips were missing start and stop times; too little information was provided to calculate time; a short time was recorded for a long distance (note that this could as easily have occurred as an error in reading the odometer as it was an error in recording the times of the trip); a round trip was recorded as one trip with time out of car not stated; the time reported out of the car was questionable because it appeared that the time between trips was recorded rather than time out of car during the course of one trip; the time out of car was questionable because the trip duration and distance were short; a round trip was recorded with time out of car questionable; the time out of the car exceeded the total trip time, or

the time out of car equaled the trip time, or the total time in car exceeded 600 minutes (10 hours).

As can be seen from Table 15, the percent of dubious data for time in the car was lowest for the control group drivers where it ranged from 10% to 18%, higher for the younger drivers (11% to 40%) and highest for the older drivers (31% to 50%). Dubious data is so high for the two older driver groups that estimates of mean time cannot be considered very reliable.

Mean number of minutes in the car was highest for 20 - 24 year old male drivers (58 - 77 min.) and lowest for the 80+ female drivers (8 - 16 min.). With respect to sex, male drivers spent more time in the car than female drivers in their same age group. Differences between males and females grew more pronounced with age. With respect to region, drivers in the southern rural regions spent most time in the car, followed by drivers in south urban regions, and drivers in the north.

It should be noted that the frequency distribution for a quantity like exposure can be skewed by a few extreme observations in one tail but not in another. Also the measurements of time and distance may be zero but can never be negative. Consequently, the standard deviation may be large relative to the size of the mean. This is true for the exposure data shown in Tables 15 and 16 in most strata, where a few respondents have reported driving great times or distances, while substantial proportions have reported not driving on the assigned day.

4.2.13 Trip Log Data: Distance Driven

Data were considered dubious and excluded if they met any of the following criteria: 50% or more of the odometer readings were missing; the distance could not be calculated because of insufficient information; the total distance travelled exceeded 1000 km. Because the restrictions were much less stringent, the percent of dubious data that had to be excluded from the analysis was much lower for all age groups for distance driven than for time in the

TABLE 15 TOTAL TIME IN CAR

SEX / REGION	MALE NORTH	MALE S.URBAN	MALE S.RURAL	FEMALE NORTH	FEMALE S.URBAN	FEMALE S.RURAL	AGE
Total Time in Car - 1 Day and 1st of 3 Days							
Number*	84	62	86	96	87	92	
Dubious	14%	13%	22%	11%	19%	16%	
Maximum	435	162	305	405	130	242	16-19
Mean	45	34	56	26	24	31	
StndardDev	73	40	56	52	34	48	
Number	60	71	72	75	75	100	
Dubious	19%	17%	19%	24%	12%	17%	
Maximum	371	413	345	325	179	208	20-24
Mean	58	67	77	40	34	39	
StndardDev	65	88	74	63	42	48	
Total Time in Car - One Day Logs Only							
Number	109	77	129	114	110	124	
Dubious	10%	18%	16%	17%	13%	7%	25-59
Maximum	494	315	465	220	225	230	CONTROL
Mean	54	62	69	35	38	45	GROUP
StndardDev	87	56	81	46	49	65	
Total Time in Car - 3 Days - Day by Day **							
Number	254	278	269	275	252	280	
Dubious	41%	39%	38%	34%	44%	39%	
Maximum	450	600	575	540	395	360	60-69
Mean	40	52	61	23	19	27	
StndardDev	61	71	84	54	38	60	
Number	187	166	249	193	148	245	
Dubious	37%	48%	36%	38%	50%	41%	
Maximum	360	585	300	465	120	281	70-79
Mean	33	37	36	20	15	23	
StndardDev	65	63	50	52	25	54	
Number	53	57	61	72	60	91	
Dubious	49%	35%	41%	35%	46%	31%	
Maximum	295	240	169	165	98	295	80 +
Mean	19	28	20	8	11	16	
StndardDev	51	50	38	24	27	47	

* Number remaining after dubious data were removed.
**Each day of the 3-day log were counted as one record.

NOTE: All minimum values were 0.

TABLE 16 DAILY TRIP DISTANCES IN KILOMETRES

SEX	MALE			FEMALE			
REGION	NORTH	S.URBAN	S.RURAL	NORTH	S.URBAN	S.RURAL	AGE
Calculated using 1 Day and 1st of 3 Days per respondent							
Number	92	69	107	101	104	102	
Dubious	6%	3%	4%	7%	4%	7%	
Maximum	714	421	264	258	153	296	16-19
Mean	37	40	51	20	25	32	
StndardDev	88	68	56	38	39	57	
Number	73	84	84	95	81	116	
Dubious	1%	1%	6%	3%	5%	3%	
Maximum	460	652	518	473	182	311	20-24
Mean	57	60	88	45	24	39	
StndardDev	84	100	95	84	36	55	
Calculated using 1 Day per respondent							
Number	123	92	154	133	121	139	
Dubious	0%	3%	1%	4%	5%	4%	25-59
Maximum	723	343	645	311	293	326	CONTROL
Mean	59	53	69	28	28	40	GROUP
StndardDev	118	62	93	47	47	57	
Calculated using 3 Days per respondent							
Number *	406	446	427	400	441	432	
Dubious	6%	2%	3%	5%	4%	4%	
Maximum	735	513	681	950	476	690	60-69
Mean	38	42	56	24	20	30	
StndardDev	75	65	78	78	42	77	
Number	292	311	360	302	281	372	
Dubious	4%	3%	8%	3%	6%	8%	
Maximum	568	973	558	742	306	436	70-79
Mean	38	38	36	17	13	22	
StndardDev	79	101	58	56	26	54	
Number	90	81	100	99	105	117	
Dubious	0%	0%	6%	0%	0%	0%	
Maximum	423	629	208	908	150	380	80 +
Mean	38	32	20	18	13	15	
StndardDev	71	92	38	94	26	44	

* Number of respondents is 1/3 number of days.
Note: All minimum values were 0.

car (Table 16). It should be noted that this is very likely because we made fewer judgments about distance than we have about time relative to distance, and put all the discrepancies in the latter against time.

As would be expected from the global estimates reported earlier and from previous studies of exposure, men in all age groups and regions drove further than women in the comparable groups, and control group drivers drove further than older drivers. Distance reported in the trip log corresponds well with distance reported driven over the past 7 days and over the past 12 months. With respect to the correspondence between the trip diary estimate and the 7 day estimate, in 25 of the 36 groups agreement in daily means was within 5 km or less, and within 7 of the 36 groups, 10 km or less. The greatest divergence between these estimates was for the 20 -24 year old females living in the north whose daily mean from the 7 day estimate was 27 (standard deviation of 25 km.) but whose daily estimate from the trip diary was 45 km (standard deviation of 84 km.).

Control group males drove 53.5 to 69.0 km per day on average, control group females, 28.0 to 39.9 km. (Quebec survey results for approximately the same age groupings were 47 and 21). Highest means were recorded for 20 - 24 year old south rural males (88 km.) and lowest for 80+ south urban females (13 km.).

Differences between men and women in equivalent age groups with respect to time in the car were less pronounced than differences with respect to distance driven. This suggests that women drive a greater part of their distance at slower speeds (probably as a result of less highway driving).

4.2.14 Comparison of Exposure Estimates with Quebec

Direct comparisons of the Ontario estimates with those from Quebec, used to estimate the necessary sample sizes (See 2.1.1 Calculation of Target Cell Sizes), are difficult, because the definitions of age strata and regions are not the same in the two surveys. The age groups that most closely agree

are the 25-59 year old group for Ontario and the "middle" group (25-64) for Quebec. When these are compared, the results are shown in the following table.

Kilometres Driven
Means and Standard Deviations

		Males	Females
Quebec	(25-64)	47 ± 71	21 ± 46
Ontario	(25-59)		
	North	59 ± 118	28 ± 47
	South urban	53 ± 62	28 ± 47
	South rural	69 ± 93	40 ± 57

The mean distances in the Ontario survey are higher. Although the standard deviation is also higher in all but one comparison, the coefficient of variation (SD/means x 100%) remains of comparable magnitude in both surveys, with the exception of males from the north.

The justification of a target sample size of 100 drivers in each stratum was that estimates of mean distance would have 95% confidence limits no more than ±30% of the value of the mean or smaller than 10 km or both. In the 36 strata used in this survey, only 20 recruited 100 or more drivers, once those with dubious data had been excluded (Table 16). Among these, 12 met the criteria of either a small standard deviation (less than 10 km) or a relatively narrow confidence interval (less than 30% of the mean). An additional 5 strata with fewer than 100 drivers also met these criteria.

4.2.15 Agreement between Postal Codes and Personal Classification

The agreement between postal code classification and respondents' personal classification was assessed. Of 1124 respondents in urban southern Ontario according to Postal Codes, 1003 (89.2%) also classified themselves as urban.

Of the 1353 respondents classed as rural southern Ontario by the Postal Codes, 971 (71.8%) also classified themselves as rural. The total agreement was 79.7% (See Table 1 in Appendix G).

4.3 Non-Response Questionnaire

The variables analysed from the non-response questionnaire included distance driven over the past 7 days and a comparison of this estimate with normal weekly driving (Tables 17 and 18). With respect to distance driven over the past 7 days, the estimates paralleled those of the main questionnaire (Table 9) in that males in the 20-59 year old groups reported most driving. Large differences in estimates between the main study and the non-response questionnaire only occurred for drivers 70 years and older. Here the number of returned non-response questionnaires with usable data was smaller than for the other groups (7 - 42) and thus the estimates of distance travelled are not as reliable.

The means and standard deviations of drivers' estimates of the driving done during the previous seven days were compared for drivers returning the survey diary (responders) and those returning only the follow-up postcard sent to all non-responders. The distributions of drivers' estimates in each stratum were markedly skewed, as indicated by the values of the standard deviation as large or larger than the corresponding mean. In none of the strata were the means of responders sufficiently different from non-responders to reach statistical significance (< 0.05, with the single exception of southern urban 70-79 year old males). However, only 11 of the differences within 36 strata were negative; if no difference exists, small positive differences and small negative differences would be equally likely, and one would expect 18 of the 36 to be negative. Only 11 negative difference might occur by chance with a probability of 0.03. Thus there is some slight evidence that responders have provided higher estimates of amounts driven than the non-responders. Finally, the standard deviations of responders' and non-responders' estimates were also compared. They often varied dramatically, but without any consistent indication that responders' estimates were

TABLE 17
Non-Response Questionnaire
Distance over past 7 days (kilometres)

SEX	MALE			FEMALE			
REGION	NORTH	S.URBAN	S.RURAL	NORTH	S.URBAN	S.RURAL	AGE
Number	67	7Ø	71	68	53	67	
Minimum	6	2	5	2	1	5	
Maximum	2ØØØ	2415	2ØØØ	322Ø	8ØØ	2167	16-19
Mean	268	294	336	196	136	2Ø2	
StandardDev	4Ø4	394	359	465	181	323	
Number	66	53	57	6Ø	54	6Ø	
Minimum	8	2Ø	3	2	3	3	
Maximum	2ØØØ	161Ø	322Ø	175Ø	1148	1ØØØ	2Ø-24
Mean	3Ø3	291	495	2Ø2	2Ø5	2Ø1	
StandardDev	34Ø	3Ø4	519	3Ø4	24Ø	213	
Number	7Ø	52	46	47	49	51	
Minimum	6	16	3	6	4	3	25-59
Maximum	322Ø	322Ø	2478	451	7ØØ	1ØØØ	CONTROL
Mean	368	423	482	116	116	213	GROUP
StandardDev	552	579	562	11Ø	131	243	
Number	69	59	63	49	46	54	
Minimum	1Ø	3	24	2	8	1Ø	
Maximum	1127	2657	1288	8ØØ	483	644	6Ø-69
Mean	241	257	266	79	98	146	
StandardDev	236	454	269	126	1Ø1	13Ø	
Number	34	4Ø	36	32	35	42	
Minimum	8	8	8	3	6	1	
Maximum	8ØØ	483	8Ø4	837	258	2415	7Ø-79
Mean	134	139	193	153	77	218	
StandardDev	181	133	185	191	63	4Ø9	
Number	12	15	11	7	14	11	
Minimum	15	6	14	1	8	6	
Maximum	4Ø3	8ØØ	2254	1343	225	4Ø3	8Ø +
Mean	146	173	352	218	58	91	
Standard Dev	12Ø	2Ø5	66Ø	496	56	114	

TABLE 18

Non-Response Questionnaire
Compare With Normal Weekly Driving

SEX	MALE			FEMALE			
REGION	NORTH	S.URBAN	S.RURAL	NORTH	S.URBAN	S.RURAL	AGE
Number	70	72	72	72	54	71	
Much Less	7.1%	6.9%	11.1%	13.9%	9.3%	14.1%	
A Little Less	21.4%	11.1%	5.6%	16.7%	11.1%	18.3%	16-19
Same	47.1%	54.2%	48.6%	44.4%	46.3%	33.6%	
A Little More	7.1%	19.4%	18.1%	18.1%	18.5%	22.5%	
Much More	17.1%	8.3%	16.7%	6.9%	4.8%	8.5%	
Number	68	54	57	61	57	60	
Much Less	5.9%	3.7%	5.3%	3.3%	7.0%	1.7%	
A Little Less	14.7%	11.1%	12.3%	13.1%	14.0%	21.7%	20-24
Same	54.4%	70.4%	57.9%	59.0%	61.4%	41.7%	
A Little More	14.7%	5.6%	15.8%	13.1%	12.3%	20.0%	
Much More	10.3%	9.3%	8.8%	11.5%	5.3%	15.0%	
Number	72	54	46	48	51	54	
Much Less	6.9%	3.7%	6.5%	8.3%	7.8%	7.4%	25-59
A Little Less	18.1%	9.3%	13.0%	18.8%	13.7%	11.1%	CONTROL
Same	55.6%	64.8%	54.3%	47.9%	49.0%	57.4%	GROUP
A Liitle More	11.1%	11.1%	19.6%	18.8%	17.6%	16.7%	
Much More	8.3%	11.1%	6.5%	6.2%	11.8%	7.4%	
Number	69	57	63	53	50	55	
Much Less	5.8%	12.3%	3.2%	7.5%	6.0%	7.3%	
A Little Less	24.6%	24.6%	19.0%	17.0%	18.0%	23.6%	60-69
Same	52.2%	42.1%	50.8%	52.8%	60.0%	47.3%	
A Little More	13.0%	14.0%	20.6%	17.0%	14.0%	14.5%	
Much More	4.3%	7.0%	6.3%	5.7%	2.0%	7.3%	
Number	33	40	35	37	37	45	
Much Less	9.1%	5.0%	8.6%	18.9%	10.8%	4.4%	
A Little Less	15.2%	20.0%	11.4%	24.3%	16.2%	33.3%	70-79
Same	54.5%	65.0%	62.9%	32.4%	59.5%	37.8%	
A Little More	15.2%	5.0%	17.1%	16.2%	13.5%	22.2%	
Much More	6.1%	5.0%	0.0%	8.1%	0.0%	2.2%	
Number	11	15	13	9	14	10	
Much Less	9.1%	-	7.7%	44.4%	-	20.0%	
A Little Less	-	40.0%	15.4%	22.2%	13.3%	60.0%	80 +
Same	63.6%	53.3%	46.2%	22.2%	53.3%	10.0%	
A Little More	18.2%	6.7%	23.1%	11.1%	26.7%	10.0%	
Much More	9.1%	-	7.7%	-	-	-	

more or less variable than those of non-responders.

4.4 Disposition of Phone Calls

Table 19 shows the disposition of phone calls for assistance received by Market Pulse. As a result of 12019 surveys and reminder letters being mailed as well as 8000 non-response questionnaires, 831 phone calls were received; that is 6.9% of those surveyed phoned regarding the survey. This is approximately 7 times the rate of calls received for the Quebec survey. The largest category of calls received were from relatives reporting that the driver we had attempted to contact was deceased (24% of the 660 calls where the reason for the call could be recorded). In some cases these drivers had been deceased for many years (up to 22). In one case the driver had been killed in a car accident 12 years prior, but the driver record was still on file. The second largest category of calls came from drivers reporting that they were no longer driving (15%).

As discussed earlier we had estimated that 108 drivers would be expected to request the option of completing the trip log in French. Only 8 such calls were received. Out of the 500 drivers offered the option of phoning in the survey results, rather than completing it by hand, only 3, or 0.6% requested this option.

5.0 DISCUSSION

5.1 Response Rates

Postal questionnaires traditionally have lower response rates than questionnaires distributed or administered through more personal contact. While the overall rate for this survey is below the overall rate of 43% achieved in the Quebec survey (RAAQ, 1986), there were a number of circumstances in the Ontario survey which may account for the difference.

TABLE 19

Disposition of Phone Calls for Assistance (October 1988 to January 1989)

	Number
1. Dead	159
2. No Longer Drives	101
3. Sent in Questionaire (Received Reminder Letter)	81
4. Questions (re:trip log)	67
5. Can't Drive/Ill/No License	51
6. Lost Questionaire	48
7. Never Received Questionaire	44
8. Will not fill out/illiterate/ Non-French language problems	29
9. Moved	24
10. Out of Country	22
11. Threw Away Questionaire	22
12. Telephone Interview in French	8
13. Telephone Interview with J. Chen	3
14. Criticism vs Bureaucracy	1
15. Unaccounted Calls*	171
TOTAL CALLS	831

* No one available to accept call, or could not locate caller when call returned; includes calls where reason for call not stated.

Prior to the survey we were aware that response rates to surveys in Ontario have declined in the past few years. Also, we assumed that the image of MTO among Ontario drivers was more neutral than the image of the RAAQ among Quebec drivers, the RAAQ having been active in lowering insurance rates for Quebec drivers. After the survey, we became aware of other factors that would decrease response rates. The population from which the sample was drawn included an unknown number of "ineligible" drivers: individuals who, for a variety of reasons, no longer drove in the province of Ontario. Our inability to identify and limit the sample to those with "active" licenses resulted in many questionnaires sent to persons who could not participate. Some of these were eliminated as the main survey was returned, but many were not so easily identified. In the supplementary survey of non-respondents, 31% of usable replies were from people who reported no longer driving. Especially in the strata of elderly drivers, the inclusion of inactive drivers (some, it transpired, who had been dead for several years) had a marked effect on apparent response rates.

The remedy is to select the sample from a file which includes only those with currently valid licenses. This requires mechanisms to get people to inform the authorities of changes in status as well as to update the file frequently. If the ineligible drivers remaining, who have moved, died or stopped driving very recently, can be eliminated from survey returns, the problem would be much reduced, if not eliminated.

The emphasis, in the definitions of age groups used for the sample, is on the driver under 25 and the driver over 60. The first group is the more transient, so that changes of address will make response rates lower; in the latter groups, failure to eliminate those who had died or who had not renewed their license will affect response. With 30 of the 36 strata targeted to the young or the old, the overall response rate will be lower than a survey such as Quebec's, where age was much more representative of the driving population.

For all drivers, the covering letter and the questionnaire were designed to convey value and clarity. The covering letter suggested that the information received would affect policy; the letter to non-respondents stated that too few replies had been received "from your area" -- an appeal to local pride. The aesthetic appeal of the questionnaire itself (or its lack) and whether it is convenient to use will influence both the quantity and quality of the responses received. Confidentiality was assured in the covering letter. Nevertheless, attitudes towards licensing authorities or fear of invasion of privacy may have been an important concern.

The explicit tactics to increase response rate were: the use of shorter trip logs, the use of a gift, and the offer of telephoned response. Shorter trip logs were expected to have a greater response rate, based on the theory that "the more work required of a respondent ... the lower the response rate." (Warwick & Lininger, 1975). However the effect, though significant, was very small. In theory, increasing the volume of trips three-fold by using a three-day diary increases the precision of exposure information by 73%; the slight increase in response with the one-day trip log found in our study does not compensate for the corresponding loss in precision. If the longer diary is more likely to be completed by people who drive less, and the shorter diary by those who drive more overall, then the resulting estimates of exposure, however precise, will be biased. This comparison must be made before a final recommendation can be made.

The gift of a road map to encourage participation worked well with women drivers, but not at all with men. Without the incentive, participation rates among men and women aged 25-59 were almost equal, 44.6% and 44.8% respectively. Use of the map was associated with a significant increase in response (to 53%) among women and a more modest decrease (to 40%) among men. The reasons for this are uncertain. Whether men and women react differently to the map as an incentive, or to all incentives, is not clear.

5.2 Main Questionnaire

With respect to the age of obtaining a license, older and female drivers obtained their licenses latest. Among the older female drivers the 90th percentile age was quite high (up to 58 for southern rural, 80+ females). It may be that older women in particular do not obtain their licenses until it is necessary as a means of transport. The fact that southern urban male drivers obtain their licenses later than male drivers in other regions is probably due to the availability of public transport in urban areas.

For drivers 25 years old and older, the most frequent method reported for learning to drive overall was parents/family. Males, especially older ones, were more likely to report that they were self-taught. Such males may have been one of the first persons in their family to learn to drive, and have learned at at time when no formal driver education courses were available. Drivers under the age of 25, urban drivers and female drivers were more likely to report having received formal driver education.

Few respondents reported themselves as being employed as drivers. Northern males were the group most frequently reporting this (the maximum being 16.5% for the 20 - 24 year old age range) reflecting the dominance of resource industries in the north, where transport of materials to more populated centres for manufacturing is required. Because such a small percentage reported themselves being employed as drivers, the estimates of distance driven because of employment cannot be considered reliable indicators of the driving exposure of professional drivers. In any event, more reliable measures for certain kinds of professional driving (e.g. buses, transport trucks) are available from other sources.

Several studies of driving exposure have shown the tendency for men to drive significantly more than women and for drivers in the 25-59 year old range to drive more than older drivers (Chipman and Morgan[1982], Lawson[1982], Peck and Kuan[1983]). Chipman and Morgan (1982) used Ontario record data from the 1977-78 period. They found that women drove

one-third as much as men on limited access roads and one-half as much as men on city streets. Their total driving distance was about 40% that of men. Our study found the same tendencies. However, compared to Chipman and Morgan's study, the gap between men and women in reported kilometers driven was reduced, particularly for women in the 25-59 year old range. This no doubt reflects the changing role of women in our society and in particular the greater percent of women who work outside the home compared to the past.

It should be noted that in our study drivers were asked to make estimates, without any aids, of number of kilometres driven in the past 7 days and in the past twelve months. Such global estimates will certainly be less reliable than trip log data. However, the general pattern of women and older drivers driving less, that was found in the more detailed estimates in the trip log diary, was also found for the global estimates.

Above the age of 24 approximately 3/4 of the respondents reported themselves as married, with the exception of the older females for whom the figure was 1/2, in the 70 -79 year old group, and 1/5 in the 80+ group. Men between the ages of 20 and 59 were more likely to report themselves as single (as opposed to divorced, separated or widowed) than were women in the equivalent age group.

With regard to employment status, as expected, the 16 - 19 year old group were most likely to report themselves as full-time students, the 20 - 59 year olds as employed, and those 60 and over as retired (Table 11). In addition, in the 16 - 19 year old group a substantial number were employed, while in the 20 - 24 year old group, a substantial number were full-time students.

In the 25-59 year old group, up to 23.0%, depending on the cell, reported themselves as retired. The high rate of reporting retirement is unexpected in such a group. Even if all of those over 55 were retired they would constitute only 1/7 or 14% of the whole cell.

The increased tendency towards more years of schooling for younger people, the tendency for girls to stay in school longer, and the tendency for urban dwellers to have attained higher levels of education than rural dwellers is reflected in the education levels reported. It should be recognized that the relatively higher levels of education reported for women compared to men may in part be an artifact of their holding a driver's license.

With respect to household size, drivers in the 25-59 year old range reported larger household sizes than drivers in the 70-79 year old range, reflecting the presence of children still living at home. Older women reported the smallest household size, reflecting both their greater tendency to be widowed than men and possibly, the greater likelihood of acquiring a license because of widowhood.

With respect to the number of trips taken, older drivers, especially females, were more likely to report fewer trips, justifying the decision to use 3 day diaries for the older drivers. Approximately 10% or fewer older drivers made 4 or more trips in a day; for drivers in the 25-59 year old group, this figure applied for 6 or more trips per day. Urban drivers took more trips than drivers in other regions.

With respect to total time spent in the car there was a significant amount of dubious data, particularly among older drivers, which had to be removed from the analysis. The main problem appeared to be that many drivers misinterpreted the question about time spent out of the car to mean time between trips and many reported to and from trips as one trip. For drivers in the 25-59 year old range, mean values for total time in the car varied between 35 and 69 minutes, while for the 80+ drivers the range was 8 to 28 minutes. As would be expected from the data on driving exposure, women spent less time in the car than men; older drivers spent less time than 25-59 year old drivers.

With respect to distance travelled, men reported greater distance than women in comparable age groups and regions, and drivers in the 25-59 year old age group reported greater distances than older drivers. Control group males drove 53 to 69 km per day on average, control group females, 28 to 40 km. The 80+ drivers drove least, 20-38 km for men and 13-18 km for women. Men in the 20-24 year old range drove most, 57-88 km per day. Differences between men and women with respect to distance travelled were more pronounced than differences with respect to time in the car, suggesting that women spent relatively more time driving at slower speeds (probably due to less highway driving).

With respect to the non-response questionnaire, there was no evidence that non-respondents drove more than respondents to the main survey. The only significant differences occurred in cells where non-respondents drove less. It should be noted that there is a reasonable chance of observing as many as four significant comparisons at the 5% level (of the 36 that were examined) by chance alone.

Phone calls for interviews in English and French were much lower than expected. Only 8 compared to an expected 108 calls were received requesting a telephone interview in French, suggesting that the decision not to translate the questionnaire into French was correct. Out of the 500 drivers offered the chance of phoning in the information collect only 3 took advantage of the opportunity.

However, phone calls for other reasons were much higher than expected (7.0% vs 1.0% in the Quebec survey). The most frequent reason for phoning, however, was to report that the driver we had attempted to contact was dead.

6.0 ACCIDENT RATES PER KILOMETRE

One of the most important uses of exposure data is to identify groups most at risk for accidents. The number of individuals in our sample was insufficient to generate enough traffic crashes to allow direct and reliable estimates of crash risk. However, data on accidents with respect to 6 age and sex groups were obtained from Ontario driver records used in previous studies of the Ontario demerit point system. These data were combined with the data gathered in this study to give accident rates per kilometre for each age and sex group.

6.1 Calculation of Accident Rates per Kilometre Driven

Two sets of Ontario driver records were used to provide the data on accident rates for each age and sex group. The first set was a random sample of 584,012 driver records for the 1981-4 period. Drivers whose records were included in the sample had to have renewed their licenses during 1985, with the exception of drivers who were 16 or 17 in 1981. This exception was made because such a large percentage of drivers become licensed at 16 or 17, that the majority of these drivers would have renewed their licenses in 1984 (3 year renewal period) and would thereby have been excluded from the sample. (This data record sample was used in an analysis of the Ontario demerit point system (Smiley et al, 1988)). This sample was more than adequate to estimate accident rates for males and females for groups 16-19, 20-24 and 25-59 years of age.

There were only 15872 drivers in this sample over 60. These drivers had a total of 2688 accidents over the 4 year period of the sample. With these few data, estimates for drivers of various age and sex groups over 60 would be unreliable. A second set of driver records had been obtained for a study of older drivers. All drivers who were 60 as of 1979, and had renewed their licenses in 1985, 1986 or 1987 were included in the sample. This second sample contained 226,232 driver records over a 6 year period from 1979 to 1984. Accident rates for males and females for groups 63-69,

70-79 and 80+ years of age were calculated using these data for the period 1981 -1984. Age 63 was used as the starting point for the first age group because the period during which accident rates were calculated started in 1981 (to correspond with the analysis of our first study involving drivers of all ages). In 1981 the youngest drivers in the older driver sample were 63. The accident rates shown in Table 20 assume that the accident rate for 60 - 62 year olds is the same as that for 63 year olds.

Mean kilometres per year for each age and sex group was determined on the basis of the daily estimates of kilometres driven from Table 16. These data were combined so that they were representative of the Ontario population with respect to region. This was accomplished by using the sampling fraction that had been used to select the records. These weighted values for kilometres driven for each age and sex group were then combined with the accident rate data to give mean and standard deviation of accidents per million kilometres and are shown in Table 20.

For each accident per million km. the 95% confidence interval was estimated. For the exposure data we made use of the standard deviations calculated for our data in these estimates. For the accident data however, we did not have estimates of standard deviations to indicate how reliable our accident count estimate was. We simply had a count of accidents over the 1981-1984 year period. In order to calculate confidence intervals, a binomial distribution, which has been shown in previous research to be a good representation of accident data, was assumed.

6.2 Discussion of Accident Rate Results

From Table 20 it can be seen that accident rates for males are lowest in the 60-69 year old group (2.64 accidents per million driver kilometres) and highest in the 16-19 year old group (7.58 accidents per million driver kilometres). Accident rates for control group males are about half of those for 16-19 year old males. The fact that these rates for males decline with the 60-69 year old group probably reflects the fact that aging effects are

TABLE 20

ACCIDENTS PER MILLION DRIVER-KILOMETRES PER YEAR

MALE	FEMALE	AGE	
7.58 (4.78-10.38)*	4.93 (3.30- 6.57)	16-19	
4.07 (2.72- 5.42)	4.01 (2.67- 5.35)	20-24	
3.49 (2.62- 4.36)	2.96 (2.11- 3.81)	25-59	CTRL GROUP
2.64 (1.97- 3.31)	2.09 (1.27- 2.92)	60-69	
3.87 (2.06- 5.68)	5.63 (3.05- 8.22)	70-79	
.67 (-.19-13.53)	12.13 (1.07-23.19)	80 +	

still relatively minor for most drivers at this point, and that because of a greater number of drivers being retired there is less rush-hour driving. The accident rate rises substantially for 80+ males. However, even in the 80+ category, which contains drivers up to the age of 100, the accident rate is still less than that of 16 - 19 year old males. However, this must be treated with caution, given the width of the 95% confidence intervals (from -0.19 to 13.53 accidents per million driver kilometres). These wide confidence intervals reflect in part the poor questionnaire return rate in this group.

For female drivers, the pattern is slightly different. Accident rates start at 4.93 accidents per million kilometres per year and decline to their lowest level in the 60-69 year old group (2.09 accidents per million driver kilometres per year). From 70-79 years old and up accident rates increase, reaching the highest point in the 80+ group. In this group accident rates are more than double that of the 16-19 year old females. However again the rate for the 80+ group must be treated with caution because of the width of the 95% confidence interval.

The difference in accident rate patterns for males and females has a number of possible causes. Factors which would predispose women to higher accident rates than men include the following. First it is clear from the male-female differences in kilometres driven versus time driven (see section 4.2.13) that women do less highway driving than men. Thus they are exposed to road conditions where accident rates are higher simply because there are more opportunities for conflicts and accidents.

A second factor is that women, especially older women, tend to become licensed at a later age than men. From Table 4 it can be seen that, apart from the 16-19 year old group, women obtain their licenses at an older age than their male counterparts. For women in the 60-69 year old group, the 50th percentile age of obtaining a license averages 8.6 years more than that for males in this age bracket. In the 70-79 year old group this difference is 9.4 years, and in the 80+ group, 4.8 years.

A third factor is that because of greater longevity of females, the mean age of all older groups may be higher than that for men. Thus the effects of age will have a greater impact on the older groups of females than on the older groups of males.

Thus there are a number of explanations relating to exposure and experience for the higher accident rate of older women.

or women younger than 70, the accident rate is lower than that for men spite the differences in type of driving and experience discussed above. iving at night is more hazardous than driving during the day. It may be that men are exposed to higher risk than women on this account. There may also be differences not related to driving exposure, but rather to driving le between the sexes that also account for these differences.

) CONCLUSIONS

he survey provided much data of interest on Ontario drivers and in ticular provided a basis for future calculation of accident rates for the ious driver populations. The finding that many drivers contacted were dead or no longer driving suggests that current published estimates, particularly of the number of older drivers, need revision, otherwise accident rates per kilometre for this group will be underestimated. Through careful coding of the dubious data, areas where future questionnaires might be improved have been identified.

Futher work remains to be done on the issue of 1 day versus 3 day logs. Though the response rate is slightly better with 1 day than with 3 day logs, the three day logs may provide more accurate data.

The map incentive had a marked positive effect on response, which was limited to women drivers. Because of this, the strategy of providing a map

raised more questions than answers. It is unknown whether other incentives would generate the same response or whether the response is specific to maps. The lack of response to the incentive or to the telephone option suggests that these methods be dropped, or possibly other incentives be tried, in future surveys.

The excellent response, given the amount of work required to fill in the survey, and the number of drivers who could not participate for a variety of reasons, suggests that selection in future surveys using only drivers who had recently renewed their licenses will yield an even higher level of response.

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APPENDIX A

1 DAY LOG SURVEY

STUDY OF THE AMOUNT AND TYPE OF DRIVING DONE BY ONTARIO DRIVERS

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Ministry

INTRODUCTION

This booklet is in two parts. In Part 1, there are some general questions about you and the driving you do. Part 2 is a trip log for you to record a very short period of driving in more detail. (Please see the label on the front cover).

PART 1 - GENERAL QUESTIONS

1. When did you first get your license to drive?

19

2. How old were you when you got your license?

years

3. How did you learn to drive?

1☐ taught myself
2☐ taught by parents or other family member
3☐ took an approved driving course
☐ other, describe

_____

_____

4. Which of the FOLLOWING TYPES OF PERSONAL-USE VEHICLE do you drive most often? (check only one)

1☐ passenger car
2☐ two wheeled motor vehicle (motorcycle, moped,etc.)
3☐ light truck (pickup truck, van, jeep, RV, etc.)

5. What is the make, model and year of the CAR, MOTORCYCLE OR LIGHT TRUCK that you drive most often?

Make (ex: Ford, Chevrolet)	Model (ex: Tempo, Celebrity)	Year

Who is the owner?
1☐ Yourself
2☐ Someone else in your household
3☐ Your employer
☐ Other _____

6. What is the make, model and year of ALL OTHER CARS, MOTORCYCLES AND LIGHT TRUCKS which are normally available to YOU OR ANYONE ELSE living in your household on a regular basis?

Make	Model	Year

Who is the owner?
1☐ Yourself
2☐ Someone else in your household
3☐ Your employer
☐ Other _____

Make	Model	Year

Who is the owner?
1☐ Yourself
2☐ Someone else in your household
3☐ Your employer
☐ Other _____

Make	Model	Year

Who is the owner?
1☐ Yourself
2☐ Someone else in your household
3☐ Your employer
☐ Other _____

Motorcycle and moped use

7. Do you ever drive a motorcycle of any type?

1☐ Yes
2☐ No — ***if No, please proceed to question 11a***

8. How often do you drive a two-wheeled motor vehicle on PUBLIC ROADS, during the months when such vehicles are normally used?

1☐ Never
2☐ Only a few times a season
3☐ Less than once a week
4☐ About once a week
5☐ More than once a week
6☐ More or less every day
☐ Other _____

9. During the past twelve months, about WHAT PERCENTAGE of ALL your driving ON PUBLIC ROADS was done on motorcycles?

%

10. Which of the following types of trip make up most of the miles/kilometres that you drive on motorcycles:

1☐ Commuting to and from work or school
2☐ Local trips, other than commuting, of less than an hour one-way
3☐ Rides for pleasure, lasting more than an hour, but less than a day
4☐ Touring, with at least one overnight stay
☐ Other _____

Estimates of the miles/kilometres that you drive

11a. Are you EMPLOYED AS A DRIVER —

1☐ of heavy trucks?
2☐ of a car or light truck making deliveries?
3☐ of large buses?
4☐ of a taxi, minibus, etc, carrying passengers for payment?
☐ in some other job where driving is what you are paid for?
(describe) _____

8☐ No, I am not employed as a driver
if No, please proceed to Question 12

11b. *About how many miles or kilometres did you drive in the past 12 months in the course of your EMPLOYMENT AS A DRIVER?*

☐ 1☐ miles 2☐ kilometres

Please do not include this driving in your answers to Questions 12-14

12. About how many miles or kilometres would you guess that you yourself have driven during the PAST TWELVE MONTHS?

☐ 1☐ miles 2☐ kilometres

13. About how many DAYS PER MONTH do you drive?

☐ days per month
(consider a month to be 30 days)

14a. About how many miles or kilometres would you guess that you drove during the PAST SEVEN DAYS?

☐ 1☐ miles 2☐ kilometres

14b. How does this amount of driving compare with your normal weekly driving?

1☐ A lot more
2☐ A little more
3☐ About the same
4☐ A little less
5☐ A lot less

A few questions about you and your household for classification purposes:

15. Do you consider the area in which you live to be:

1☐ Built-up or Urban?
2☐ Rural?

16. Family status. Are you:

1☐ Married or living as a couple?
2☐ Single? *(Check one)*
3☐ Widowed, separated, or divorced?

17. Employment status. Are you:

1☐ Employed, full or part-time?
2☐ Temporarily unemployed?
3☐ Retired? *(Check one)*
4☐ Homemaker?
5☐ Student, full time?
☐ Other. Describe.

_____

18.. Education: how far have you gone in school?

1☐ Grade eight or less
2☐ Some high school
3☐ Finished high school
4☐ Beyond high school, some University or Community College
5☐ Completed Community College
6☐ Completed undergraduate degree
7☐ Completed post graduate degree

"Your household" means you and anyone who shares your home on a regular basis:

19. How many licensed drivers are there living in your household, OTHER THAN YOURSELF?

☐

20. How many persons aged 16 or over, living in your household, do NOT have a driver's license?

☐

21. How many children live in your household?

☐ 6 years and under ☐ 7 to 15 years

22. How many members of your household are currently employed full-time, OTHER THAN YOURSELF?

☐

23. How many members of your household , aged 16 or over are currently full-time students, OTHER THAN YOURSELF?

☐

PART 2 - TRIP LOG

This trip-log is for your personal use — it does not apply to anyone else in your household. **Please record each trip that you drive on the day specified on the front cover.**

The log covers all the driving you do, including any driving you may do as part of your employment. **Exception: if driving is your main job** (for example, if you are a bus, taxi or heavy truck driver), the driving you do for your employer is not to be recorded in the log.

To make it easy to keep one day's driving together, please consider that your day starts at 3.01 am in the morning, and finishes at 3.00 am the following morning. For example, if you are recording your driving on a Thursday, a trip home from friends at 1.20am on Friday morning would be recorded with Thursday's trips.

If you do not drive at all on "your" day, please write at the start of the log: "I did not drive today" (give us the date — this is important).

Even if you drive very little, your responses are vital to our picture of driving in Ontario.

EXAMPLE SHOWING HOW TO TO USE THE TRIP-LOG

1st and 2nd trips:

In the morning, George leaves home to go to work. He stops for 4 minutes to pick up someone who lives nearby, and who works for the same company. During the rest of the journey to work, he stops for 5 minutes to buy some doughnuts for the office.

His journey to work requires two columns because the number of passengers changed. The first column gets him to his co-worker's house. The second column gets both of them to work. The 5 minutes out of the car in the second column was to buy the doughnuts.

3rd Trip:

At the end of the morning, George takes a company car to briefly visit three clients. He spends 15 minutes with each client (a total of 45 minutes). On the way back to the office, he stops for 10 minutes at a snack bar to pick up a sandwich.

All of these trips can be combined in one column because the main reason he took the car (driving as part of his job) has not changed, nor has the number of passengers (none). The stop for a sandwich is not important enough to require a change of columns. The total time out of the car is therefore 55 minutes (45 + 10).

4th Trip

At the end of the working day, George drives straight home (without his co-worker).

COMMENTS:

MINISTRY OF TRANSPORTATION
c/o 1155 Yonge Street, Toronto, Ontario M4T 1W2

APPENDIX B

LETTER OF INTRODUCTION

Ministry of Transportation / Ministère des Transports
Ontario

NO MAP INCENTIVE

NO TELEPHONE OPTION

Assistant Deputy Minister
Safety and Regulation
East Building
Downsview, Ontario
M3M 1J8

Mr. WILLIAM ACKER
L4 C6
SUTTON, ONTARIO
L0E 1R0

October 17, 1988

Dear Mr. ACKER:

You are part of a group of drivers selected by the Ontario Ministry of Transportation to participate in an important study of driving. By helping with this study, we will find better ways to reduce road accidents.

For many years, our researchers have studied when and where road accidents occur. Unfortunately, they know little about when, where, and how much Ontario motorists drive. To find this out, we are asking motorists to tell us about just one day of driving. In this way, each driver is asked for only a small amount of information. We will put this information all together to build a picture of driving in Ontario. The information will be treated confidentially and it will be impossible to identify you personally with any of your responses.

Will you please help us? We ask that you fill out a short questionnaire in the enclosed booklet, and record some details of each trip that you make on the day listed on the front cover of the questionnaire booklet.

Even if you drive very little, you are an important part of the "picture" we are trying to build. WHETHER OR NOT YOU DRIVE A VEHICLE, PLEASE FILL IN PART 1. Then use Part 2 only for the day listed on the questionnaire. YOUR DAY FOR RECORDING YOUR DRIVING TRIPS IS THIS COMING MONDAY. If it happens that you do not drive on that day, please tell us in the booklet. It is important. Do not tell us about trips you made on some other day.

After you have completed the questionnaire and recorded your trips, please mail the booklet right away in the return envelope. The postage is already on the envelope. If you have any questions about this study, please telephone Heather McKay collect at (416) 964-6071.

Thank you very much for helping us with this study.

Yours truly,

Margaret Kelch
Registrar of Motor Vehicles

N.B. Sur demande, il nous fera plaisir de vous faire parvenir ce questionnaire en français. Téléphonez Monique Blais au (416) 964-6071, frais virés. Merci.

APPENDIX C

IDENTIFICATION LABELS

APPENDIX C

Identification Labels.

For the purposes of tracing respondents in a filtered follow-up system, questionnaires and envelopes were labeled with driver identification codes. The driver identification code consisted of an 8-digit number which included:

Mailing: (1 = first 6000; 2 = second 6000);
Questionnaire Type: (1 = 1-day no options; 3 = 3-day no options;
4 = 1-day with map; 5 = 1-day with phone);
Day of the Week: (M=Mon; T=Tues; W=Wed; H=Thurs; F=Fri; S=Sat; U=Sun);
Cell: (Age X Sex X Region, 01 to 36);
Subject Number Within Cell: (001 to 335)

MTO created the labels at the time of drawing the sample. Two types of labels were needed; one for the mail-out envelopes; and another to appear on the front of the questionnaire.

The labels on mail-out envelopes included:

driver identification code
driver's name
address
postal code

At least three sets of the above label type were used; one set for the questionnaire envelope, one set for the reminder letter, and the third set for the non-response questionnaires.

The labels on the questionnaires had the following formats:

Example of a 1-day Label:

driver identification code
PLEASE FILL OUT THE QUESTIONNAIRE AND TRIP LOG
ON THE VERY NEXT WEDNESDAY (day of the week).

Example of 3-day Label:

driver identification code
PLEASE FILL OUT THE QUESTIONNAIRE AND TRIP LOG
THE VERY NEXT WEDNESDAY, THURSDAY, AND FRIDAY
(days of the week).

A separate set of labels were necessary for the non-response questionnaire. This label only consisted of the driver identification code, an was printed onto the non-response questionnaire itself.

APPENDIX D

REMINDER LETTER

REMINDER LETTER (1 DAY LOG)

Dear XXXXXX :

A few weeks ago, we sent to you a questionnaire concerning the amount and type of driving you do.

The importance of this survey is such that I take the liberty of asking you again to participate. Remeber that this information will help our researchers to build a better "picture" of driving in Ontario. This picture will help us to improve road safety for us all.

Even if you drive very little, you are an important part of the "picture" we are trying to build up. WHETHER OR NOT YOU DRIVE A VEHICLE PLEASE FILL IN PART 1. THEN, USE PART 2 ONLY FOR THE DAY LISTED ON THE QUESTIONNAIRE. YOUR DAY FOR RECORDING YOUR DRIVING TRIPS IS THIS COMING (day of the week). IF IT HAPPENS THAT YOU DO NOT DRIVE ON THAT DAY, PLEASE TELL US. IT IS IMPORTANT. DO NOT TELL US ABOUT TRIPS THAT YOU MADE ON SOME OTHER DAY.

After you have completed the questionnaire and recorded your trips, please return the booklet in the envelope we provided. If you have already returned the questionnaire, please excuse us for this reminder.

We thank you for your co-operation.

Yours sincerely,

N.B. Sur demands, il nous fera plaisir de vous faire parvenir ce questionnaire en francaise. Telephonez au (416) 964-6544, frais vires. Merci.

APPENDIX E

NON-RESPONSE QUESTIONNAIRE

840.01 NR

Ministry of Transportation Ontario

Safety and Regulation, East Bldg., Downsview, Ont. (416)964-6071

DRIVER SURVEY

Dear Driver: November 24, 1988

A few weeks ago, I wrote you a ring for details of the driving you do. You may recall that we are trying to build a picture of the driving done in Ontario so that we can better understand accident trends. Unfortunately, we do not have enough replies from your area. At the time of writing we have not heard from you.

Could I ask you to send me the answers to the few following questions? A prepaid envelope is enclosed for your reply. The information will be used only by our road safety researchers. Your answers will be kept completely anonymous and are of great value in helping us understand accident trends.

If you have returned the questionnaire or have talked with us by telephone, I thank you for taking the time to respond. Your cooperation is very much appreciated.

Margaret Kaich
Registrar of Motor Vehicles

p0f1 = 840.01 NR

p0f2-6 23M34344

Survey Status 1= no longer drive 2= computer Q2-5 3= language problem p0f7

If you currently do not drive a motor vehicle, please complete question #1 and then return the survey in the prepaid envelope. If you drive a vehicle even a few times a year, please fill out questions 2 to 5.

1. If you currently do not drive a motor vehicle, please indicate the major reason.

_____ p1f1-53

2. About how many miles OR kilometers would you guess that you drove during the PAST SEVEN DAYS?

p2f1 ___ ~~miles~~ ~~OR~~ p2f2 ___ miles or kilometers p2f3 = conversion to km

3. How does this amount of driving compare with your normal weekly driving?

5 much more 4 a little more 3 same 2 a little less 1 much less p2f

4. About how many DAYS PER MONTH do you drive?

___ days p2f5

5. Describe the CAR, MOTORCYCLE, or LIGHT TRUCK that you drive most often?

_____ p2f6 Make (e.g. Ford)

_____ p2f7 Model(e.g. Tempo)

_____ p2f8 Year

PLEASE RETURN TO THE MINISTRY OF TRANSPORTATION IN THE REPLY-PAID ENVELOPE. THANK YOU FOR YOUR ASSISTANCE.

Si vous ne pouvez pas répondre à ce questionaire parce qu'il est en Anglais, s'il vous plaît cochez la boîte et renvoyez cette lettre dans l'enveloppe incluse dont l'affranchissement est payé d'avance. ☐ 1

Se lei non ha potuto rispondere questo questionario perche e scritto in Inglese, per piacere marcate questo vuoto e ritornate questa lettera nella busta allegata. ☐ 2

Se voce não pôde responder esta pesquisa proque estava escrita eu inglês, por favor, marque no quadrado embaixo, coloque esta carta no envelope em anexo e envie pelo correio. ☐ 3

如果您因語言困难不能回答这些问題，請
填上旁边的空格并回所附信封将答卷寄回 ☐ 4

APPENDIX F

TRIP DIARY RESULTS FOR 16-24 YEAR OLDS, ALTERNATE FORMATS

Trip Log: Number of Trips - One Day Only

SEX	MALE			FEMALE			
REGION	NORTH	S.URBAN	S.RURAL	NORTH	S.URBAN	S.RURAL	AGE
Number	52	39	52	47	56	55	
Dubious	4%	8%	6%	2%	4%	4%	
% Zero Trips	33%	31%	25%	51%	48%	53%	16-19
One Trip	6%	10%	12%	4%	4%	7%	
Two Trips	19%	18%	25%	17%	14%	18%	
Three or more	42%	41%	39%	28%	34%	22%	
Number	36	42	53	50	42	61	
Dubious	8%	2%	4%	6%	2%	2%	
% Zero Trips	14%	24%	11%	36%	36%	34%	20-24
One Trip	8%	5%	8%	10%	7%	5%	
Two Trips	19%	24%	17%	16%	14%	20%	
Three or more	58%	48%	64%	38%	43%	41%	

Trip Log: Number of Trips - 1 day and 1st of 3 Days

SEX	MALE			FEMALE			
REGION	NORTH	S.URBAN	S.RURAL	NORTH	S.URBAN	S.RURAL	AGE
Number	94	67	105	105	69	105	
Dubious	4%	6%	6%	3%	57%	5%	
% Zero Trips	36%	37%	23%	50%	52%	49%	16-19
One Trip	9%	10%	9%	7%	4%	9%	
Two Trips	16%	15%	31%	20%	16%	15%	
Three or more	39%	37%	38%	24%	27%	28%	
Number	70	83	83	91	81	116	
Dubious	6%	2%	7%	8%	5%	3%	
% Zero Trips	20%	30%	12%	39%	36%	36%	20-24
One Trip	11%	4%	11%	9%	9%	7%	
Two Trips	23%	19%	23%	17%	25%	24%	
Three or more	46%	47%	54%	36%	31%	33%	

Trip Log: Number of Trips - 3 Days Only - Day by Day

SEX	MALE			FEMALE			
REGION	NORTH	S.URBAN	S.RURAL	NORTH	S.URBAN	S.RURAL	AGE
Number	126	84	159	174	129	150	
Dubious	5%	4%	6%	3%	0%	6%	
% Zero Trips	48%	42%	23%	52%	54%	41%	16-19
One Trip	6%	6%	8%	8%	9%	10%	
Two Trips	14%	24%	33%	17%	15%	18%	
Three or more	32%	29%	36%	23%	23%	32%	
Number	102	123	90	123	117	168	
Dubious	3%	2%	13%	10%	8%	4%	
% Zero Trips	28%	39%	17%	44%	39%	35%	20-24
One Trip	9%	7%	13%	8%	13%	14%	
Two Trips	25%	17%	41%	17%	26%	27%	
Three or more	38%	37%	29%	31%	22%	24%	

SEX	MALE			FEMALE			
REGION	NORTH	S.URBAN	S.RURAL	NORTH	S.URBAN	S.RURAL	AGE
Trip Distances in Kilometres - 1 Day and 1st of 3 Days							
Number	92	69	107	101	70	102	
Dubious	7%	3%	4%	7%	54%	8%	
Maximum	714	421	264	258	153	296	16-19
Mean	37	40	51	20	22	32	
StndardDev	88	68	56	38	35	57	
Number	73	84	84	95	81	116	
Dubious	2%	2%	6%	3%	5%	3%	
Maximum	460	652	518	473	182	311	20-24
Mean	57	60	88	45	24	39	
StndardDev	84	100	95	84	36	55	
Trip Distance in Kilometres - One Day Only							
Number	52	40	55	45	56	55	
Dubious	4%	5%	0%	7%	4%	4%	
Maximum	249	421	265	117	153	296	16-19
Mean	31	53	59	18	24	31	
StndardDev	51	84	59	27	36	56	
Number	38	43	52	52	42	61	
Dubious	3%	0%	6%	2%	2%	2%	
Maximum	460	652	361	473	182	284	20-24
Mean	63	75	86	51	27	42	
StndardDev	85	127	79	92	41	54	
Trip Distance in Kilometres - 3 Days Only - Day by Day							
Number	116	87	157	168	145	141	
Dubious	13%	0%	7%	12%	0%	13%	
Maximum	714	924	540	258	177	346	16-19
Mean	35	40	47	15	18	35	
StndardDev	89	106	72	32	32	54	
Number	105	123	95	128	117	166	
Dubious	0%	2%	8%	5%	8%	4%	
Maximum	354	323	519	523	318	416	20-24
Mean	37	42	80	40	28	45	
StndardDev	62	65	93	82	44	68	

Total Time in Car - 1 Day Only

SEX	MALE			FEMALE			
REGION	NORTH	S.URBAN	S.RURAL	NORTH	S.URBAN	S.RURAL	AGE
Number	48	37	45	45	53	51	
Dubious	6	5	9	3	5	6	
Maximum	270	162	305	155	130	242	16-19
Mean	44	38	66	25	29	24	
StndardDev	62	43	63	35	37	44	
Number	31	39	49	44	39	56	
Dubious	8	4	6	9	4	5	
Maximum	371	413	345	325	179	208	20-24
Mean	70	81	82	45	38	43	
StndardDev	76	100	75	67	48	48	

Total Time in Car - 1 Day and 1st of 3 Days

SEX	MALE			FEMALE			
REGION	NORTH	S.URBAN	S.RURAL	NORTH	S.URBAN	S.RURAL	AGE
Number	84	62	86	96	65	92	
Dubious	14	9	24	12	43	17	
Maximum	435	162	305	405	130	242	16-19
Mean	45	34	56	26	25	31	
StndardDev	73	40	56	52	35	48	
Number	60	71	72	75	75	100	
Dubious	14	14	17	23	10	20	
Maximum	371	413	345	325	179	208	20-24
Mean	58	67	77	40	34	39	
StndardDev	65	88	74	63	42	48	

Total Time in Car - 3 Days Only - Day by Day

SEX	MALE			FEMALE			
REGION	NORTH	S.URBAN	S.RURAL	NORTH	S.URBAN	S.RURAL	AGE
Number	107	75	125	153	99	125	
Dubious	24	12	43	27	-	33	
Maximum	450	193	550	405	123	200	16-19
Mean	42	32	52	19	16	36	
StndardDev	76	43	69	42	29	45	
Number	87	96	67	92	106	130	
Dubious	18	30	34	42	18	42	
Maximum	270	269	315	305	285	267	20-24
Mean	38	37	65	31	33	40	
StndardDev	49	53	68	55	44	54	

APPENDIX G

AGREEMENT BETWEEN POSTAL CODES AND PERSONAL CLASSIFICATION

Table 1: Extent of Agreement in Urban/Rural Designations between Postal Codes and Personal Classification

Personal Classification	Postal Classification		
	Urban	Rural	Total
Urban	1003 (89.2%)	382 (28.2%)	1385
Rural	121 (10.8%)	971 (71.8%)	1092
Total	1124	1353	2477

TABLE 13

Number in Household

SEX		MALE			FEMALE		
REGION	NORTH	S.URBAN	S.RURAL	NORTH	S.URBAN	S.RURAL	AGE
Number	98	71	111	108	108	110	
One	2.0%	1.4%	0.9%	1.9%	0.9%	3.6%	
Two	7.1%	4.2%	5.4%	12.0%	3.7%	9.1%	16-19
Three/Four	63.3%	57.7%	59.4%	51.9%	52.7%	55.4%	
Five or more	27.5%	36.5%	34.2%	34.4%	42.5%	31.8%	
Number	74	85	89	98	85	120	
One	8.1%	7.1%	2.2%	6.1%	3.5%	2.5%	
Two	17.6%	28.2%	23.6%	25.5%	31.8%	30.8%	20-24
Three/Four	52.7%	41.2%	58.4%	47.9%	42.4%	45.8%	
Five or more	21.7%	23.7%	15.7%	20.3%	22.4%	20.8%	
Number	123	95	156	138	128	144	
One	13.8%	15.8%	10.9%	8.0%	13.3%	11.1%	25-59
Two	26.0%	31.6%	33.3%	33.3%	33.6%	27.8%	CONTROL
Three/Four	37.4%	34.7%	40.4%	42.8%	39.8%	40.3%	GROUP
Five or more	22.7%	17.9%	15.3%	15.9%	13.3%	20.9%	
Number	145	153	146	142	153	153	
One	24.1%	20.3%	17.8%	25.4%	28.1%	17.0%	
Two	55.9%	53.6%	61.0%	62.0%	60.1%	69.3%	60-69
Three/Four	17.2%	22.8%	18.4%	11.3%	10.5%	12.5%	
Five or more	2.8%	3.3%	2.8%	1.4%	1.3%	1.3%	
Number	101	107	131	104	100	135	
One	37.6%	44.9%	32.8%	48.1%	52.0%	54.1%	
Two	49.5%	46.7%	56.5%	43.3%	37.0%	39.3%	70-79
Three/Four	8.9%	8.4%	9.2%	6.7%	10.0%	6.6%	
Five or more	4.0%	-	1.6%	2.0%	1.0%	-	
Number	35	29	36	37	37	45	
One	48.6%	44.8%	36.1%	62.2%	73.0%	75.6%	
Two	40.0%	48.3%	27.8%	29.7%	21.6%	20.0%	80 +
Three/Four	11.5%	6.8%	27.8%	5.4%	5.4%	4.4%	
Five or more	-	-	8.4%	2.7%	-	-	